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THE GENUS EUPHYDRYAS SCUD. OF BOREAL AMERICA (LEPIDOPTERA NYMPHALIDÆ)

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It is evident from genitalic study, as well as from superficial appearance based upon adequate series, that there are in reality only five known species of *Euphydryas* in North America, north of Mexico, namely, *phæton* Dru., *chalcedona* Dbldy. and Hew., *anicia* Dbldy. and Hew., *editha* Bdv., and *gillettii* Barnes. If we are to progress in evolutionary classification, we must subordinate many names to racial rank and try, as far as our present knowledge goes, to place each in the obvious light of their related development. This is sometimes difficult to do, in fact impossible to do, because we have to follow the nomenclature of an unnatural scheme of classification. For example, take the name *editha* Bdv. Being the first named of its kind, its name takes the rank of species and theoretically heads its group; whereas actually it probably is not the oldest in point of time or in line of descent. It, therefore, cannot claim proved prime position.[1] The same is true of *anicia* and perhaps of the others. However, we must follow code (in most cases) until we have definite proof to back up a more logical arrangement for classification; and until that time there is no other way of placing species names in list order except by the rule of priority. This subject is gradually becoming a serious matter and deserves more attention on the part of progressive entomologists.

In a check list the last listed name in a genus may in some cases be supposed to be the oldest or the most ancient species. *Euphy. gillettii* can, I believe, claim this position in its surviving and its unique relationship to old world species. *Editha,*

1 See definitions of species, race, form, tr. form, etc., in November 1927 Entomological News.

with its barbed left projection of the uncus, somewhat like *gillettii,* comes next above, while *anicia* approaches nearer the *chalcedona* category because of its having several local forms and forms showing intergradation. *Phaeton* is in reality quite near *chalcedona,* but will probably always be listed as a species.

In making the genitalic slides for this article each genitalia has been uniformly pressed, so that the shape of the harpe and projections are not distorted any more than is necessary. This is very important. The projections of the uncus "tell the story," especially the left projection. In a kind there is not much variance to its style. It is fairly constant as a medium for comparative analysis. The shape or general contour of the harpe is helpful, but it is not as important a key to relationship as is the left projection. I might state here that the old style manner of simply opening up and spreading out the genitalia as a whole is practically useless because of the many lines and the mass distortion to be overcome. The drawings of the genitalia, herein illustrated, were made with a Spencer drawing machine, which is superior to a camera lucida.

I have illustrated the original types wherever possible, or examples from type localities, and I regret that these figures cannot be in color, but students having material from or in the region of type localities will probably find the halftones of help. In this article I have not the space to review the faults and misidentifications of others, including myself. Perhaps the trouble has been lack of original illustrations and of serious thought as to type locality. In a genus like *Euphydryas* the type locality is all-important. It is a genus in which the names cannot cover a great expanse of territory, except in the case of the species *phaeton.* For example, a *perdiceas* cannot come from Los Angeles County, a desert *monoensis* from the mountains of Montana, or a *nubigena* from Colorado, etc.

Regarding *Euphydryas* transition forms. There are only three kinds of these possible. Two albifusism and melanifusism come under maculation change, and the other, chromatism, under color change. No more names can be added except as they come under these divisions.

I wish to thank the following gentlemen for their help with photographs, loan of types or genitalic drawings: Barnes,

Leussler, Van Duzee, McDunnough, Williams, Holland and N. D. Riley of London. A few notes and some new descriptions follow.

Schausi Clark, a synonym. I have examined specimens of *phaeton* from New York, Massachusetts, Minnesota, Missouri, and North Carolina and they are similar to those from the type locality near New York City. Deviation as to blackness, size, or color of light maculation (cream to white) is not a constant factor, but is found "within the limits of the species" at the type locality and elsewhere. In his paper Mr. Clark has not considered the original type, its illustration, or its type locality.

Phœthusa Hlst., a form. Undoubtedly a mendelian form and not a transition form. This name represents examples in which the upper sides of the wings are quite dark, even to practically covering the red at outer margins. The black replaces the red or covers it especially at the margins, leaving light designs intact or slightly reduced. In a typical series the specimens will grade to *phœthusa. Chalcedona* on the west coast produces similar examples, only more commonly. They are not worthy of a special name, as we should not encourage the naming of mendelian forms.

Cooperi Behr, a synonym. Dr. Behr at the time he named *cooperi* could not have known the type of *chalcedona,* as both are similar and one within the locality range of the other. Illustration shows types (?) from Edwards' collection.

Dwinellei Hy. Edw., a form, in northern California, not as yet constant enough to deserve racial rank. Named from one male having considerable red on the upper side of its primaries.

Euphy. chalcedona Dbldy. and Hew., race **wallacensis** Gund, tr. f. **idahoensis** new tr. f.

Having the white spotting on both upper and under sides elongated through the interspaces after the style of *chalcedona fusimacula* Barnes. The red maculation remains the same. In the type the upper wings happen to be more fused than the lower. Tr. f. *huellemani* Comst. represents melanifusism. Classification: albifusism; fairly well developed.

Holotype ♀, expanse 47 mm., **Wallace, Idaho** (Huelleman), June 4, 1921. Type in the author's collection.

Note: There is a possibility that the name *huellemani* may have to take the species name with the name *wallacensis* as the normal form name. Questioned.

Perdiceas Edw. Distinct and deserving a racial classification. Common in June along the Columbia River, east of Portland. My illustration shows genitalia of a Victoria, B. C., example, also so-called Edwards' types, which he thought were synonymous with *cooperi* Bdv.

Paradoxa McD. represents a connecting link with the *anicia* group, but according to original description is more restricted than a form and, therefore, possibly a local form approaching the rank of race. Probably could be termed a race, as specimens from extreme northern Idaho are constant enough. Form *georgei* Gun. of *olancha* Wri. also approaches *anicia,* but is found with its species which makes it a straight form. An examination of tr. f. *nigrisupernipennis* Gun. places it with *perdiceas* rather than with *paradoxa.*

Sierra Wright is nothing but a very reddish race of *chalcedona,* very constant in its territories but grading through *truckeensis* to *mcglashanii* and hence to *chalcedona.* Dr. McDunnough first pointed out its relationship to *chalcedona.*

Anicia Dbldy. and Hew. Mr. N. D. Riley of the British Museum made the drawing of the genitalia of the type specimen from which my illustration was made. *Anicia* is constant at Banff with predominant red color. In regions way to the south in Colorado it produces darker specimens, some quite dark. For this reason the racial name, *eurytion* Mead is available, as *eurytion* was given for darker specimens out of the Edwards collection. Figure A attempts to show a dark specimen with figures B, C, and D as intergrades. *Brucei* is a synonym. More names cannot be applied from this district. *Capella* Barnes is distinct.

Euphy. anicia, Dbdly. and Hew., race **bernadetta** Leus., tr. f. **belli** new tr. f. Upper side.—Primaries entirely black except for marginal red row of spots which remain typical. Secondaries with typical marginal spots and rest of wing well clouded over with black except for traces of original design which is about covered, the lighter maculation showing through. Under side.—Usual design, heavy with black. White spots

misted over and indistinct, basal areas showing usual melanic transition. Classification: melanifusism, nearly final grade.

Holotype ♂, expanse 40 mm., **Harrison, Sioux County, Nebraska,** June 16, 1929. In author's collection, and named after Mr. E. L. Bell of Flushing, New York, who took this interesting specimen while on a collecting tour with Mr. Leussler of Omaha, Nebraska.

Maria Skin. From the type genitalia made by Mr. Williams. I am delighted to record for certain that this name comes under the *anicia* group. There is a possibility that the two tr. fs. placed under *maria* may have to be placed under *wheeleri* Hy. Edw. This point will be cleared up in the near future.

Alena B. and Benj. This name is misspelled on plate 14. Frank Morand secured a good series this year from near Cedar City, Utah.

Editha Bdv. This species has been taken at various points in southern California, but the examples taken by Mr. Ireland in the Greenhorn Mountains, up from Bakersfield in Kern County, are nearest the type, having the strong red bands across the wings on the upper sides. This region is probably the general old mining country from whence the types came. The types are in the Barnes collection at Decatur, Illinois.

Euphy. editha Bdv., race **wrighti** new race

Constantly smaller than *editha* Bdv. and more of a brownish red, a deeper red. Red bands across wings less defined. Black maculation heavier and dominant. Basal areas darker. All designs less clear-cut.

Holotype ♂, expanse 40 mm. Allotype ♀, expanse 46 mm. **San Diego, California** (George Field), March 7 and 8, 1907. Types in author's collection. Twelve pairs of paratypes, same dates and location. Examples placed in the Barnes collection and Canadian collection at Ottawa, Canada.

Note: Slightly atypical *editha* occurs in the hills north of San Diego, at old Camp Kearney. This new race probably finds its metropolis in the mountains of Lower California, reaching north. The types were taken within the city slightly south at a place which Mr. Field calls "forty acres" upon low sea-level hills, which are now being built over. Tr. f. *fieldi* is

referable to the parental species. At the special request of Mr. Field I am naming this race after his old friend, Mr. William S. Wright, of the San Diego Museum.

Rubrosuffusa Comst. is a form of *nubigena* Behr in which the outer half of the secondaries on the upper side is nearly clear red and almost free of transverse design. They grade in, and are not uncommon wherever *nubigena* occurs.

Euphy. editha Bdv., race **nubigena** Behr, tr. f. **tiogaensis** new tr. f. Having the white maculation of both upper and under sides elongated or fused through the interspaces. Illustrated (upper side) by Comstock in *Butterflies of California* as plate 35, figure 6. The type has been personally examined. Classification: albifusism.

Holotype ♂, expanse 32 mm., **Tioga Pass** in **Yosemite National Park, California** (Comstock), August 3, 1922. Type in collection of the Los Angeles Museum, Los Angeles, California.

Euphy. editha Bdv., race **nubigena** Behr, tr. f. **boharti** new tr. f. Having the maculation of the inner half of both wings on the upper sides quite melanic, especially the basal portions. The black lines on the under sides are dense through the basal portions also. The left wing of the primary is slightly torn. Classification: melanifusism, a 50 per cent development.

Holotype ♀, expanse 37 mm., **Tuolumne Meadows, Yosemite National Park, California,** July 5, 1928. In author's collection and named after Mr. R. M. Bohart of Berkeley, California, who is an energetic collector of lepidoptera. (Unfortunately Mr. Bohart's name is misspelled on plate 16.)

Euphy. editha Bdv., race **baroni** Edw., tr. f. **dunni** new tr. f. Upper wings on both sides quite dark except for marginal red edge and submarginal row of white spots. Lower wings slightly blurred dark, more so on upper side. Classification: melanifusism, upper wings especially. (The tr. f. *mirabilis* Wright represents albifusism.)

Holotype ♂, expanse 43 mm., **Mendocino County, California** (Eastman), 1912. Type in author's collection. Named after Mr. Norman R. Dunn of Berkeley, who is a coming young lepidopterist.

Euphy. editha Bdv., race **baroni** Edw., tr. f. **sternitzkyi**

new tr. f. Maculation entirely as in typical *baroni,* but the color is buff instead of red. Classification: chromatism, red to yellow.

Holotype ♀, expanse 46 mm., **Hillsboro,** near San Mateo, **San Mateo County, California** (Sternitzky), April 27, 1929. Type in author's collection. Named after Mr. R. F. Sternitzky of San Francisco, who took this example with typical specimens in this locality, just south of San Francisco.

Edithana Strd. Northern California produces specimens which might at first thought seem redder and smaller *baroni* (between *baroni* and *rubicunda*). This race was distinct, so I sent to Berlin and secured photos of the type of *edithana* Strd. and they matched, so we must raise *edithana* out of the synonomy.

Beani Skin. I had some misgivings about this name until Mr. R. C. Williams of Philadelphia made a slide of the type for me which places it with the *editha* group. A slide of tr. f. *blackmorei* Gun. is altogether similar.

Hutchinsi McD. Mr. Hutchins has procured for me this year a long series of this race which, as Dr. McDunnough says, approaches *taylori* Edw. A long series of *taylori* proves this. *Beani* is redder and strangely comes nearer *colonia* Wright. I have a good series of what really matches *colonia* from Priest River district in Idaho, therefore I think that *beani* is nothing more than a small *colonia* Wright. A percentage of my *hutchinsi* are small and dark like *montanus* McD. I have not a series of these specimens, but the name might stand as a local form until compared in a proper series to prove a racial constancy.

Euphy. editha Bdv., race **lehmani** new race. Looks like a small *augusta* Wright, but has its maculation less clear-cut. The ground color is white, however, which makes it lighter than *augusta.* Undoubtedly from the southern California *editha-augusta* stem, as is *hutchinsi,* from the northern *taylori* branch of the family.

Holotype ♂, expanse 30 mm., allotype ♀, expanse 35 mm., Lehman Caves Resort, **Mount Wheeler, White Pine County, Nevada,** June 4, 1929. Types in author's collection. Ten pairs of paratypes, same locality with early June dates. Examples

placed in the Barnes collection at Decatur, Illinois, and in the Canadian national collection at Ottawa, Canada. All specimens collected by Mr. Frank Morand of Los Angeles.

Euphy. gillettii Barnes, tr. f. **herri** new tr. f. In typical *gillettii,* on the upper sides the white rows of spots closely parallel the conspicuous red band across both wings. In this tr. f. these spots are clouded over and barely visible with black fusion. The basal areas are also shaded over at the expense of the red design. The white maculation on the under sides is also sprinkled over with misty black and the base is narrowed to black design and loses its white, which is usual in melanifusism. Classification: melanifusism, final degree unknown.

Holotype ♀, expanse 43 mm., **Martina,** near Stark, **Missoula County, Montana,** July 9, 1929. In author's collection and named after Mr. C. W. Herr of Priest River, Idaho, who was fortunate enough to take this interesting specimen.

BRACHYRHINUS (OTIORHYNCHUS) CRIBRICOLLIS (Gyll.)

This, the fourth species of the genus to be found in western North America and the first record of it for the continent, was first taken by Mr. Haymaker on the roots of *Viburnum tinus* at Montebello, Los Angeles County, October 3, 1928. In June and July of this year other specimens have been collected in Los Angeles County, as well as at Montebello, San Fernando and Pasadena, by Mr. H. M. Armitage, Deputy Horticultural Commissioner, and his associates. It has in the main been taken from privet and viburnum though also recorded by Mr. Woglum from lawns. The determination was kindly made for me by Mr. L. L. Buchanan of the United States National Museum. It is a native of southern Europe. The other three species, also natives of Europe: *sulcatus* Fab., *rugosostriatus* Goeze (not *rugifrons* Gyll. as formerly labeled), and *ovatus* (Linn.), have long been established in northeastern and northwestern America, the last two destructive as strawberry-root feeders, the first mainly a greenhouse pest. *B. sulcatus* Fab. is now well established in several places in California, and the other two are found from time to time in our strawberry fields.—Edwin C. Van Dyke.

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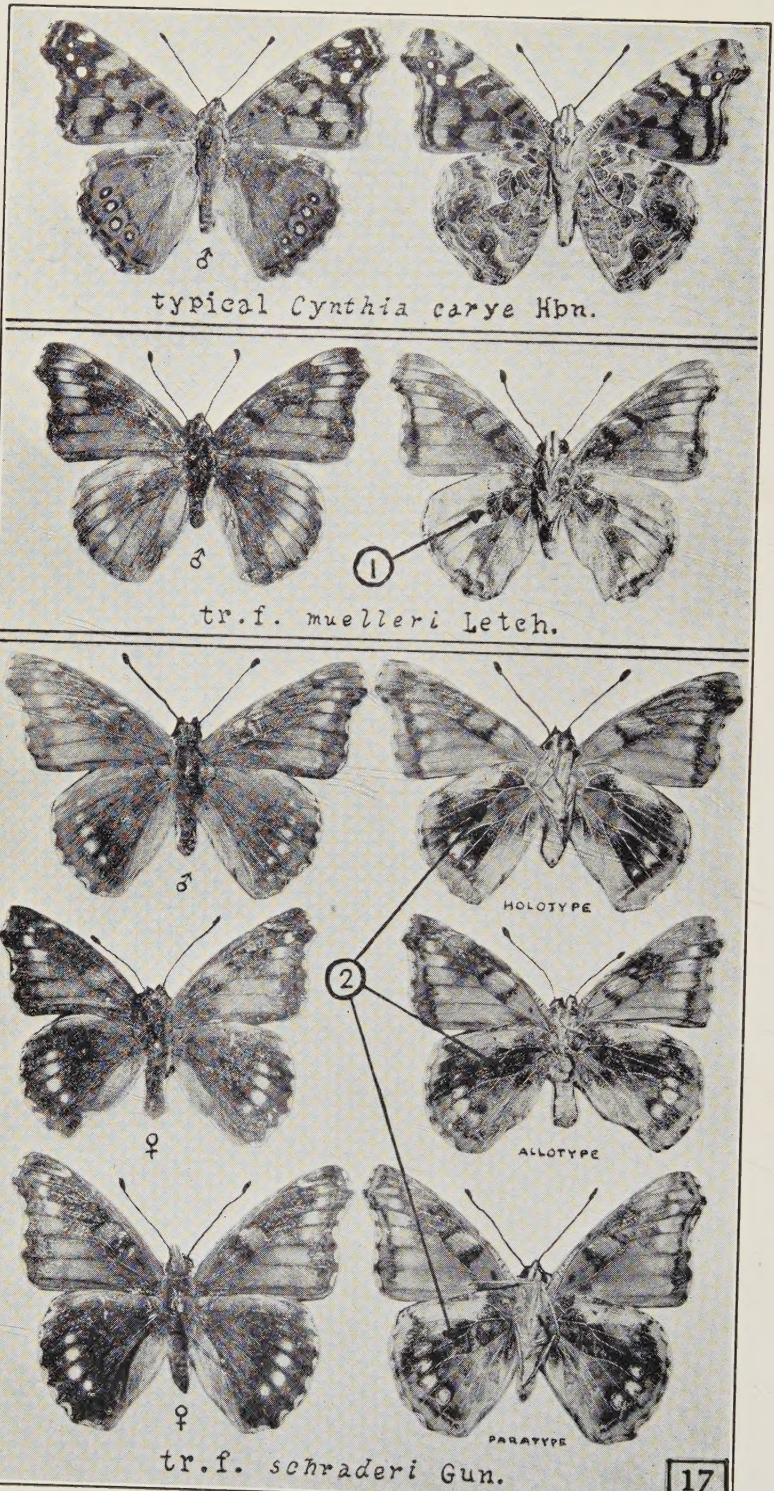
♂
typical Cynthia carye Hbn.
♂
1
tr.f. muelleri Leteh.
♂
HOLOTYPE
2
♀
ALLOTYPE
♀
PARATYPE
tr.f. schraderi Gun.
17

Gunder

AN ADDITION TO CYNTHIA CARYE HBN. (LEPIDOPTERA, NYMPHALIDÆ)

BY J. D. GUNDER
Pasadena, California

Cynthia carye Hbn., tr. f. **schraderi** new tr. f.

On page 270 of the November 1927 *Entomological News* I illustrated in the sequence of their transition a number of examples of tr. f. *muelleri* Letch., which represent albifusism or the progressive trend for the species *carye* Hbn. Therein I expressed a hope that melanifusistic or retrogressive specimens would soon be found. Mr. William Schrader of Los Angeles has been fortunate this year in securing several of these specimens, which I recognized as new, and I am pleased to give them his name.

Cynthia cardui L. and *Cynthia carye* Hbn. are closely related species, in consequence their transition forms would naturally be similar; therefore *elymi* Ramb. of *cardui* parallels *muelleri* Letch. of *carye* and thus is *ate* Stkr. like *schraderi*. The type of *ate* Stkr. is illustrated in the above mentioned reference. *Schraderi* generally resembles *muelleri* in maculation change on the upper sides except that in *muelleri* the white spots elongate or fuse out more, while in *schraderi* this light pattern is restricted and the darker areas are usually more extended. On the under side of the secondaries in well-developed examples the real difference is obvious, making identification easier, to wit: *muelleri* has white in the vein interspaces opposite the cell, as indicated on Plate 17, arrow marked No. 1; while in *schraderi* this area of the wing is always black or dark as shown by arrows marked No. 2. In extreme degrees or in well-developed examples these areas would be quite extended and dark. (See accompanying Plate 17.)

Holotype ♂, expanse 47 mm., May 13, 1929, **Los Angeles, California.** Allotype ♀, expanse 41 mm. (not average), May 6, 1929, Los Angeles, California. Types in author's collection. One paratype ♀, May 28, 1929, in author's collection and one paratype ♀, date unknown, in collection of the Los Angeles Museum. All types from Mr. Schrader.

Note: The synonymy of Grinnell's *intermedia* and *letcheri*, both albifusism, has been discussed in the above mentioned reference.

A NEW CORIMELÆNA (HEMIPTERA)

BY E. P. VAN DUZEE

Corimelæna californica Van Duzee, n. sp.

Form and size of *interrupta* nearly, but with the head much shorter, the humeri less tumid, the interruptions of the pale elytral border smaller and located at apical third, and nearly the whole surface closely and strongly punctured. Short, oblong-ovate, pale portion of corium produced mesad of cubitus. Length, 3 mm.

Head broad and short, its length almost equal to the width between the eyes; surface uniformly, closely deeply punctate, omiting only two basal spots between the ocelli; tylus broad, flat, uniformly punctured like the cheeks; margins of cheeks strongly sinuate. Pronotum broad anteriorly, the sides strongly arcuate, the humeri but feebly tumid; surface strongly punctate, but little less so on the disk posteriorly; callosities represented by small smooth areas. Scutellum punctured like the pronotum, a little more closely so toward the margins. Pale yellowish portion of the corium nearly impunctate, indistinctly interrupted at about the apical third; antennæ pale, as in *interrupta*; legs black, tibiæ piceous; tarsi pale; margin of sixth ventral segment and of genital plates of female with a pale spot. Rostrum piceous, attaining hind coxæ. Genital segment of male short, broadly feebly sinuate.

Described from the types and six female paratypes taken by Mr. Paul Baldwin, July 21, 1929, at Guerneville, Sonoma County, California.

Type, male, No. 2519, Museum California Academy of Sciences, taken July 21, 1929, by Mr. Paul Baldwin of Oakland, at Guerneville, California; allotype, female, No. 2520, Museum California Academy of Sciences, taken May 8, 1922, by Mr. Louis S. Slevin at Paraiso Springs, Monterey County, California.

This species has the posterior tibiæ without postero-dorsal spinules, and in Malloch's key of 1919 would run to the section containing his *nanella* (= *marginella* Dall.), but the pale margin of the corium extends mesad of the cubitus. *C. extensa* is quite distinct by its elongate form, more triangular head, and the obvious smooth median line on the scutellum. One paratype is retained in the collection of the California Academy of Sciences, one will be deposited in the United States National Museum, and four (one immature) are in the collection of Mr. Robert Usinger of Oakland.

NEW MEXICAN THYSANOPTERA

BY DUDLEY MOULTON

This paper includes the descriptions of eight new species of Thrips collected by Professor G. F. Ferris while on a trip through Mexico, for the most part on the west coast, during 1925 and 1926.

Elaphrothrips albospinosus Moulton, n. sp.

Female, holotype: Color blackish brown, including all femora, middle and hind tibiæ; fore tibiæ yellowish brown in outer third, darker at margins; fore tarsi yellowish brown, middle and hind tarsi brown. Antennal segments I and VI to VIII blackish brown, II dark brown at base shading to yellow at tip, III yellow clouded with brown in distal fifth, IV yellow in basal two-thirds, dark brown in distal third, V brown in basal third, blackish brown in distal two-thirds; all prominent head and body spines clear yellow.

Total body length 2.8 mm.; head length .51 mm., width .21 mm.; head summit, length .057 mm.; width .114 mm.; prothorax, length .225 mm., width .39 mm.; pterothorax, width .40 mm.; abdomen, width .57 mm.; tube, length .44 mm., width at base .105 mm. Antennæ: length (width) I, 45 (45); II, 70 (42); III, 150 (36); IV, 120 (36); V, 105 (33); VI, 90 (30); VII, 75 (27); VIII, 60 (18); total length 750 microns. Length of spines: anteoculars 90 microns, postoculars 180 microns, on anterior angles of prothorax 30 microns, mid-laterals 70 microns, on posterior angles 120 microns, on ninth abdominal segment 375 microns, at tip of tube 300 microns.

Length of head including summit 2.5 longer than width across eyes, broadly constricted behind eyes, head summit twice as wide as long. Cheeks slightly swollen and widest at about one-fifth the head's length from posterior margin. Anteocular spines short, about one-half as long as prominent postoculars, both pairs sharply pointed. Cheek spines small, transparent and inconspicuous. Eyes large. Ocelli present but very small. Mouth cone short with rounded tip. Antenna 1.5 times longer than head, segments III to V elongate-clavate, VI and VII elongate-ovate and pediculate, VIII spindle-shaped; III with two sense cones, one on outer margin and a second on ventral inner margin, IV with four sense cones.

Prothorax .45 as long as head, spines along anterior margin and on anterior angles vestigial, mid-laterals moderately small, those at posterior angles long and prominent with blunt tips. Pterothorax only very slightly wider than prothorax with sides straight and parallel. Legs long and slender, fore femora thickened, fore tarsi armed with a short broad-seated tooth. Wings wanting.

Abdomen elongate-ovate with segments six to nine reduced gradually. Tube .85 as long as head. Spines on ninth abdominal segment slightly shorter than tube.

Type material: Female holotype taken on common grass, 1925-1926 (Professor G. F. Ferris). Type in author's collection (Moulton, No. 2565).

Type locality: **Jalisco, Nayarit, Mexico.**

This is the smallest of all known species in this genus. It may be separated from *angusticeps* Crawford and *tener* Priesner known from Mexico, as follows: In *angusticeps* the anteocular spines are much longer than the postoculars, while in this species the postoculars are much the longer. In *tener* the basal third of the fifth antennal segment is yellow, body bristles are dark, light colored only on abdomen, and the third antennal segment is 210 microns long, while in *albospinosus* the fifth antennal segment is brown in the basal third, all body bristles are clear, and the third antennal segment is 150 microns long.

Hoplothrips mexicanus Moulton, n. sp.

Female, holotype: Color blackish brown including all legs except only fore tarsi, which are brown. Antennal segments I, II and V to VIII uniformly dark brown except tip of II and base of V, which are lighter; III clear yellow with a shading of brown in outer third; IV yellowish brown in basal half, dark brown in distal half, prominent body spines dark brown. Wings clouded, each with a dark median band extending two-thirds its length.

Total body length (abdomen distended) 2.66 mm.; head length .28 mm., width across cheeks .216 mm.; prothorax length .20 mm., width, including coxæ, .45 mm.; pterothorax width .50 mm.; abdomen width .50 mm.; tube length .25 mm., width at base .096 mm., at tip .050 mm. Antennæ: length (width) I, 24 (36); II, 60 (38); III, 84 (34); IV, 84 (39); V, 81 (36); VI, 75 (33); VII, 60 (30); VIII, 36; total length 495 microns. Length of spines: postoculars 111 microns, on anterior margin of prothorax 72 microns, on anterior angles 36 microns, mid-laterals 90 microns, on posterior angles, outer 138 microns, inner 144 microns, on ninth abdominal segment 300 microns, at tip of tube 210 microns.

Head 1.3 longer than wide; cheeks slightly arched, constricted at the base but not necklike. Postocular spines long, placed 45 microns back from posterior margin of eyes, with blunt tips. Cheek spines short and inconspicuous. Eyes large, ovate, occupying more than one-third the length of the head. Ocelli fully developed, posterior pair contiguous with median inner margins of eyes. Mouth cone short, extending three-fifths over prosternum. Labrum pointed and slightly overhanging, labium broadly rounded. Antenna 1.75 longer than head, intermediate segments elongate-clavate, IV to VII pedicu-

late, VIII broadly joined to VII, III with one sense cone, IV with three.

Prothorax .7 as long as head and including coxæ more than twice as wide as median length of pronotum. All normal spines developed, those on anterior margin approximately twice as long as pair at anterior angles, pair at posterior angles very long, mid-laterals also well developed but shorter than those on posterior angles. Pterothorax broad and strong. Fore femora thickened, each fore tarsus armed with a broad-seated tooth. Wings fully developed, with parallel sides, fore pair with sixteen double-fringe hairs along posterior margin.

Abdominal segments II and VI of uniform width. Tube .9 as long as head. Abdominal spines strong, those on ninth abdominal segment somewhat longer than length of tube.

Male allotype: Similar in shape and color to female, but with fore femora more noticeably enlarged and outer pair of spines on ninth abdominal segment shortened.

Type material: Female holotype, male allotype, and nineteen female paratypes taken on *Pithecolobium* sp., July 26, 1927 (Professor G. F. Ferris). Types in author's collection (Moulton, Nos. 2562 and 2571).

Type locality: **Mazatlan, Mexico.**

This species may be compared with *Hoplothrips fuscus* Morgan, but is easily separated by the color of the intermediate antennal segments. In this species segment III is yellow and IV yellowish brown only in basal half; in some paratypes the fourth segment is almost uniformly dark brown. In *fuscus* segment III is "yellow; IV and V yellow, very slightly infuscate at the sides near the tip; six yellow in basal half, infuscate in apical half."

Holopothrips ferrisi Moulton, n. sp.

Female, holotype: Color uniformly brown including all legs and antennal segments I and II, III to VI clear yellow except for a faint cloud of brown in distal third of segment V and a slightly darker shade in distal half of VI, VII and VIII light brown. Wings clear, prominent body spines light yellowish brown.

Total body length: 2.5 mm.; head length .316 mm., width .233 mm.; prothorax length .20 mm., width, including coxæ, .33 mm.; pterothorax width .416 mm.; abdomen width .43 mm.; tube length .20 mm., width at base .075 mm. Antennæ: length (width) I, 30 (36); II, 60 (30); III, 105 (30); IV, 78 (30); V, 87 (30); VI, 72 (24); VII, 60 (21); VIII, 36; total length 580 microns. Length of spines: postoculars 45 microns, on anterior angles of prothorax 36 microns, midlaterals 45 microns, on posterior angles, outer 81 microns, inner

54 microns, on ninth abdominal segment 180 microns, at tip of tube 180 microns.

Head 1.36 longer than wide, cheeks almost straight, back of head with numerous transverse, indistinct, wavy lines. Postocular spines moderately short and stout, with dilated tips, cheek spines inconspicuous. Eyes large, reniform, and contiguous with anterior ocellus in front, protruding inward behind so that their interval is about one-third the greatest width of a single eye. Ocelli closely placed and anterior in position. Mouth cone extending past posterior margin of prosternum and broadened at tip. Labrum distinctly pointed. Antenna 1.8 longer than head. Segment VII with wide pedicel, VIII broadly united to VII; sense cones moderately short, segment III with three and IV with 3 + 1.

Prothorax .66 as long as head and .3 wider than long. Well developed spines on anterior angles and middle of sides which are about half as long as those at posterior angles, all with dilated tips; pair along anterior margin vestigial and with pointed tips. Transverse, semireticulated lines of pronotum indistinct, more clearly defined on mesonotum and clearly defined on metanotum but longitudinal in position. All legs slender, fore tarsi unarmed. Wings fully developed with parallel sides, thirteen to fifteen double-fringe hairs on fore pair.

Abdomen slender, tube .7 as long as head and slightly less than three times as long as width at base.

Type material: Female holotype, thirteen female paratypes taken on *Coccoloba* sp. in 1926 (Professor G. F. Ferris), and named in honor of Professor Ferris. Types in author's collection (Moulton, No. 2555).

Type locality: **San Blas, Nayarit, Mexico.**

This species may be separated from *H. tenuis* Hood by the following characters: It has well-developed, blunt-tipped spines on anterior angles of prothorax, but those on the anterior margin are vestigial and pointed, the head is 1.36 longer than wide, and antennal segments III to V are uniformly clear yellow. *H. tenuis* Hood has a minute bristle on each anterior angle, but those along anterior margin are well developed; the head is 1.6 longer than wide, and the bases of antennal segments III to V are darker.

Holopothrips elongatus Moulton, n. sp.

Female, holotype: Color uniformly dark brown including all legs and antennal segments I and II (III to VIII broken off). Wings shaded light brownish yellow especially along borders.

Total body length 3.3 mm.; (abdomen distended); head length .42 mm., width across eyes .22 mm.; prothorax length .18 mm., width, including coxæ, .39 mm.; pterothorax width .48 mm.; tube length .27 mm., width at base .08 mm. Length of spines: postoculars 60 microns, on anterior margin of prothorax 30 microns, at posterior angles, outer and inner subequal 93 microns, on ninth abdominal segment 255 microns.

Head twice as long as width across eyes; cheeks straight and parallel. Postocular spines well developed but short, with blunt tips; cheek spines inconspicuous. Eyes large, slightly protruding, reniform as in other members of the genus. Ocelli large, anterior in position, almost completely surrounded and obscured. Mouth cone elongate, extending to posterior margin of prosternum, truncate at end, labium sharply pointed. Maxillary palpi with first segment very short, second very long, together 95 microns.

Prothorax .44 as long as head and approximately twice as wide as long. Spines along anterior margin well developed but short, those on anterior angles and the mid-laterals vestigial; pair on posterior angles long and stout. Pterothorax clearly wider than prothorax; sculpturing on pronotum indistinct, on mesonotum clearly defined and largely transverse but continued backward to a point in the center; sculpturing of the metanotum clearly defined, the broken wavy lines longitudinal in position, becoming semireticulate toward posterior margin. Legs slender, fore tarsi unarmed. Wings fully developed, with parallel sides but noticeably narrowing toward their tips. Fore pair with nineteen to twenty double-fringe hairs.

Abdomen slender, tube .64 as long as head and about 3.5 longer than width at base. Spines on ninth abdominal segment approximately as long as tube.

Type material: Female holotype, one female paratype taken on *Lonchocarpus sericeus,* 1925-1926 (Professor G. F. Ferris). Types in author's collection (Moulton, No. 2568).

Type locality: **Mexico** (exact location not given).

This species may be compared with *H. tenuis* Hood, but is easily distinguished by the longer head, the absence of developed spines along anterior margin of prothorax and at the middle of the sides, and by the larger number of double-fringe hairs, 19 to 20 as compared with 10 to 12.

Diceratothrips brevitubus Moulton, n. sp.

Female, holotype: Color blackish brown with abdominal segments II to VI lighter, legs blackish brown, also antennæ except segment II which is lighter toward the tip, and III which is yellow clouded brown at tip. Wings brownish at base with a median dark line extending to near middle, borders of fore wings light brownish. Prominent body spines and wing cilia dark brown.

Total body length 3.64 mm.; head length .45 mm., width at eyes .266 mm., at cheeks .250 mm.; prothorax length .20 mm., width, including coxæ, .32 mm.; pterothorax width .50 mm., abdomen width .48 mm.; tube length .20 mm., width at base .10 mm. Antennæ: length (width) I, 54 (42); II, 75 (39); III, 156 (39); IV, 126 (42); V, 90 (36); VI, 75 (33); VII, 60 (30); VIII, 45; total length 633 microns. Length of spines: anteoculars 105 microns, postocellars 45 microns, postoculars 210 microns, on anterior margin of prothorax 60 microns, on anterior angles 60 microns, mid-laterals 60 microns, on posterior angles, outer 126 microns, inner 135 microns, on ninth abdominal segment 360 microns, at tip of tube 270 microns.

Head 1.8 longer than width at eyes, vertex swollen and overhanging basal segments of antennæ; cheeks straight and parallel. Postocular bristles long, extending across eyes and far in front of head, with pointed tips. A pair of well-developed spines on forehead which project to the middle of the second antennal segment a shorter spine placed close behind each posterior ocellus; cheek spines inconspicuous. Eyes large, anterior ocellus at tip of swollen vertex, posterior ocelli also large and contiguous with inner anterior margin of eyes. Mouth cone reaching three-fourths across prosternum, blunt at tip, labrum pointed. Antennæ 1.6 longer than head; sense cones normally developed.

Prothorax less than .5 head's length, all normal spines well developed, those on posterior angles more than twice as long as others, all with blunt tips. Pterothorax with slightly arched sides. Legs slender, noticeably spinose, fore tarsi unarmed. Wings fully developed, fore pair with twenty-two double-fringe hairs.

Abdomen elongate, narrower than pterothorax, reduced gradually beyond second segment. Segments II to VI reticulate in anterior two-thirds and cross-striate in posterior third. Tube short, less than .5 as long as head. Bristles on ninth segment and the tip much longer than tube.

Type material: Holotype, three female paratypes, four larvæ taken January 10, 1926, from an unknown host plant (Professor G. F. Ferris). Types in author's collection (Moulton, No. 2556).

Type locality: Along Cohahuayana River, State of **Colima, Mexico.**

This species may be compared with *D. brevicornis* Bagnall, from the Hawaiian Islands, but separated by its longer head, 1.8 as compared with 1.6 longer than wide, the short blunt sense cones as compared with the long, pointed cones and the much shorter tube, .45 as compared with 1.12 as long as head.

Liothrips colimæ Moulton, n. sp.

Male, holotype: Color dark chestnut brown with much red hypodermal pigment in thorax and abdomen. Legs concolorous with body except tips of fore tibiæ and fore tarsi, which are lighter. Antennal segments I and II dark brown, III to VI yellow, VII shading from yellow to light brown, VIII light brown. Wings shaded at base, otherwise clear. Prominent body spines brown.

Total body length 1.55 mm.; head length .20 mm., width .14 mm.; prothorax length .10 mm., width, including coxæ, .233 mm.; pterothorax width .266 mm.; tube length .108 mm., width at base .06 mm. Antennæ: length (width) I, 15 (27); II, 36 (27); III, 54 (27); IV, 48 (27); V, 48 (27); VI, 45 (22); VII, 39 (21); VIII, 30; total length 330 microns. Length of spines: postoculars 45 microns, on anterior angles of prothorax 30 microns, mid-laterals 18 microns, posterior angles, outer 60 microns, inner 39 microns, on ninth abdominal segment 135 microns, at tip of tube 120 microns.

Head 1.43 longer than wide, vertex slightly swollen; cheeks straight and parallel. Postocular spines short, with blunt tips. Eyes large, rounded. Ocelli anterior in position, fore ocellus at tip of vertex and directed forward. Mouth cone narrowed in the middle, pointed, reaching two-thirds over prosternum. Labrum sharply pointed. Antenna 1.65 longer than head.

Prothorax .5 as long as head, spines at anterior angles well developed but short, pair at posterior angles somewhat longer, those along anterior margin and on middle of sides vestigial. Pronotum with transverse wavy lines intermingled with smooth areas giving a blotched effect. Pterothorax with evenly formed sides. Legs normal, fore tarsi unarmed. Wings fully developed with parallel sides, fore pair with eight double-fringe hairs.

Abdomen reduced gradually beyond second segment. Tube .6 as long as head, spines on ninth segment and at tip somewhat longer than tube.

Female, allotype: Total body length 2.0 mm. Similar in shape and color to male, but with first abdominal segments somewhat broader.

Type material: Male holotype, female allotype, one male and one female paratype taken January, 1926, from leaves of an undetermined shrub (Professor G. F. Ferris). Types in author's collection (Moulton, No. 2557). Named after type locality.

Type locality: Along Cohahuayana River, State of **Colima, Mexico.**

This species is very closely related to *L. dampfi* Karny, and may be only a variety of that species. It is separated chiefly by the color of antennal segments III to VI, which are clear yellow, while in *dampfi* IV is slightly clouded brown at the tip,

and V is light brown at the tip. The mouth cone, like *dampfi*, is weakly truncate and in this respect it also approaches the genus *Gynaikothrips,* the labrum is sharply pointed.

Liothrips querci Moulton, n. sp.

Female, holotype: Color uniformly dark chestnut brown including all legs and first antennal segment, II dark brown at base, shading to clear yellow at tip, III to VI clear yellow with only a faint shading of brown at tip of VI, VII and VIII brown. Wings clear. Prominent body spines dark brown.

Total body length 2.83 mm.; head length .366 mm., width at eyes .216 mm., cheeks .20 mm.; prothorax length .20 mm., width, including coxæ, .366 mm.; pterothorax width .50 mm.; abdomen width .466 mm.; tube length .283 mm., width at base .083 mm. Antennæ: length (width) I, 30; II, 63; III, 138; IV, 120; V, 99; VI, 84; VII, 69; VIII, 42; total length 615 microns. Length of spines: postoculars 105 microns, on anterior margin and angles of prothorax 72 microns, mid-laterals 120 microns on posterior angles, outer 150 microns, inner 132 microns, on ninth abdominal segment 195 microns, at tip of tube 240 microns.

Head 1.75 longer than wide, broadest across at eyes, slightly narrower behind eyes; cheeks straight and narrowed again at the base. Postocular spines long and prominent, placed 75 microns back from posterior margins of eyes, with blunt tips. Eyes large, somewhat concave on inner margins where they have a tendency to surround the outer sides of the posterior ocelli which are contiguous with them. Anterior ocellus on swollen vertex. Mouth cone long and sharply pointed, reaching beyond posterior margin of prosternum. Antenna 1.66 longer than head, segment three increasing in width gradually from its broad base to the tip, not clavate in shape as in most species in this genus.

Prothorax .54 as long as head, with all normal spines strongly developed, with blunt tips. Pterothorax much wider than prothorax. Sculpturing on metanotum distinctly longitudinal from anterior margin. Legs long and slender, fore tarsi unarmed. Wings fully developed with parallel sides, fore pair with sixteen double-fringe hairs.

Abdomen elongate. Tube long and slender, .75 as long as head and about 1.3 wider at base than at tip. Spines on ninth abdominal segment long but much shorter than length of tube.

Male allotype: Similar in shape and color to female, but somewhat smaller.

Total body length 2.66 mm.; head, length .35 mm., width at eyes .21 mm.; at cheeks .183 mm.; prothorax, length .166 mm., width .30 mm.; mesothorax width .416 mm.; abdomen width .366 mm.; tube length .30 mm.; width at base .07 mm. An-

tennæ: length (width) I, 30; II, 54; III, 150; IV, 126; V, 105; VI, 78; VII, 66; VIII, 42; total length 645 microns. Length of spines: postoculars 90 microns, on anterior margin of prothorax 69 microns, on anterior angles 60 microns, mid-laterals 90 microns, on posterior angles, outer 126, inner 120 microns, on ninth abdominal segment 240 microns, at tip of tube 210 microns.

Type material: Female holotype, male allotype, two male and two female paratypes and one larva taken on oak foliage, January 18, 1926 (Professor G. F. Ferris). Types in author's collection (Moulton, Nos. 2558 and 2567).

Type locality: **Coalcoman, Michoacan, Mexico,** altitude 7500 feet.

This species seems to be most closely related to *L. major* Buffa, but I am unable to make a comparison because of the brief description of the latter species. *L. micurus* Bagnall, Egypt, has a much more prominent and swollen vertex, a shorter and broader tube and greatly reduced thoracic bristles.

Rhynchothrips brevitubus Moulton, n. sp.

Female, holotype (macropterous): Color dark chestnut brown to blackish brown including all legs and antennal segments I, II and V to VIII, II yellow in first and third quarters and brown in second and fourth quarters, IV dark brown with a light band in third quarter. Thorax and abdomen with red hypodermal pigment. Wings brownish in basal third, clear in distal two-thirds, all prominent body spines dark brown.

Total body length 1.82 mm.; head length .23 mm., width .20 mm.; prothorax length .183 mm., width, including coxæ, .383 mm.; pterothorax width .466 mm.; abdomen width .516 mm.; tube length .15 mm., width at base .083 mm. Antennæ: length (width) I, 36 (36); II, 51 (36); III, 69 (33); IV, 69 (39); V, 66 (34); VI, 66 (33); VII, 48 (27); VIII, 30; total length 450 microns. Length of spines: postoculars 66 microns, on anterior margin of prothorax 42 microns, on anterior angles 42 microns; mid-laterals 51 microns on posterior angles, outer 105 microns, inner 84 microns, on ninth abdominal segment 81 microns, at tip of tube 111 microns, basal wing spines 48, 51, and 51 microns, respectively.

Head .2 longer than wide; cheeks slightly arched. Postocular spines as long as eyes, with blunt tips. Postocellar spines somewhat longer than diameter of ocelli. Eyes large, subovate. Anterior ocellus on slightly swollen vertex and directed forward; posterior ocelli large and contiguous with anterior inner margins of eyes. Mouth cone extremely long and pointed, extending halfway across

mesosternum. Antenna moderately stout, twice as long as head, segment III clavate with one sense cone on outer surface, IV to VII oval-pediculate, VIII broadly joined to VII and sharply conical.

Prothorax .3 shorter than head and twice as wide as median length of pronotum, the latter with short median thickening. All spines present with blunt tips, pair on each posterior angle longest, the outer somewhat longer than the inner. Pterothorax broad. Legs fairly stout, fore femora thickened, each fore tarsus armed with a broad, blunt tooth.

Abdomen large. Tube very short, .65 as long as head and approximately twice as long as basal width.

Male allotype (brachypterous): Similar in shape and color to female, except that the fore femora are more noticeably enlarged and the tooth on each fore tarsus is more prominent, angular, and bears two spines on its outer surface.

Total body length 1.6 mm.; head length .216 mm., width .17 mm.; prothorax length .183 mm., width, including coxæ, .40 mm.; pterothorax width .39 mm.; abdomen width .43 mm.; tube length .15 mm., width at base .08 mm. Antennæ: length (width) I, —; II, —; III, 75 (30); IV, 78 (33); V, 72 (30); VI, 69 (27); VII, 54 (27); VIII, 36; total length 450 microns. Length of spines: postoculars 81 microns, on anterior margin of prothorax 45 microns, on anterior angles 48 microns, midlaterals 60 microns, on posterior angles, outer 105 microns, inner 96 microns, on ninth abdominal segment, spines 120 microns, spurs 45 microns, at tip of tube 120 microns.

Type material: Female holotype, two macropterous and nine brachypterous female paratypes, male allotype and two brachypterous male paratypes, found deforming leaves of an unknown host plant, July 26, 1927 (Professor G. F. Ferris). Types in author's collection (Moulton, No. 2561).

Type locality: **Mazatlan, Mexico.**

This species is most closely related to *R. dentifer* Hood, but may be separated by its somewhat larger size, longer third and fourth antennal segments, 69, as compared with 54-57 m., respectively, in the latter species, and by the striking bandlike coloration of the third antennal segment. *H. dentifer* has the third antennal segment brownish yellow, shaded with brown at the sides and over distal two-thirds. The fore wings of *brevitubus* are brownish in basal third, while in *dentifer* they are brownish in the middle.

MISCELLANEOUS STUDIES IN THE COLEOPTERA, NUMBER THREE

BY DR. FRANK E. BLAISDELL, SR.
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Blapstinus falli Blaisdell, n. sp.

Form oblong-oval, slightly more than twice as long as wide, moderately convex. Color black; trophi, four basal joints of antennæ and legs, dark rufous; distal joints of antennæ and tarsi, rufo-piceous. Pubescence moderately abundant, inconspicuous, slender, moderately short, recumbent and fuscous in color. Wings a little longer than the elytra.

Head wider than long, a little less than half as wide as the pronotum; sides quite evenly arcuate from the tempora to the rounded epistomal angles, and moderately convergent before the eyes; epistomal apex broadly, slightly emarginate; frons evenly and less than moderately convex, evenly and rather closely punctate, punctures moderately small, more or less oval, finer anteriorly and laterally, with some evidence of coalescing in longitudinal lines, separated by a distance equal to from one-half to one times their own diameter; frontal and oblique sutures obliterated. Eyes moderately coarsely faceted, upper segment slightly unevenly circular and in diameter equal to the length of third antennal joint; lower segment larger and oval, in greatest diameter equal to the combined length of second and third antennal joints. Antennæ rather slender, moderate in length, about attaining the pronotal base; distal four joints slightly incrassate; joints two, three, and four quite cylindrical, two about two-fifths as long as three, four a fourth longer than two, five about three-fourths as long as four; five, six, and seven subequal and as long as two; eight a little wider and as long as wide; nine and ten noticeably transverse, ten one-fourth wider than long; eleven obovate, as long as three, sides converging to the truncate apex, rufous in apical half; last four joints very slightly compressed.

Pronotum less than twice as wide as long, apex truncato-emarginate between the obtusely rounded apical angles; base broadly arcuate in middle three-fifths, broadly but not deeply sinuate laterally, angles subrectangular to slightly obtuse; sides parallel, broadly, evenly and moderately arcuate, converging slightly anteriorly, marginal bead rather fine; disk evenly and moderately convex, rather densely punctate, punctures oval, larger than those of the head, slightly irregular in distribution, somewhat denser laterally where there is some coalescence in longitudinal lines; centrally the punctures are separated by a distance equal to one or two times their diameter.

Propleuræ longitudinally rugose. Pronotal margin appearing explanate when viewed from beneath, projecting in anterior three-

fourths to a distance equal to the length of the fifth antennal joint, the abruptly inflexed surface slightly convex and smooth and defined from the rugose surface by a rather sharp impressed line.

Elytra about a half longer than wide, base feebly emarginate opposite the basal pronotal lobe, slightly wider than the pronotal base; humeri obtusely rounded; sides parallel, feebly arcuate, broadly rounded at apex; disk moderately convex, less so on the dorsum; striate, striæ composed of scarcely impressed punctures in the sutural area, outer striæ feebly impressed where the intervals become very slightly convex; strial punctures about three times as large as those of the intervals and separated by a distance equal to two or three times their diameter; interstitial punctures irregular, small, separated by a distance equal to two to four times their diameter. Surface very finely and microscopically reticulate. Scutellum triangular, punctate centrally. Epipleuræ not distinctly punctate.

Undersurface of the body quite evenly punctate, punctures small, smaller on middle of the abdominal segments, the latter more or less rugulose laterally and the punctures somewhat larger; punctures not dense on the fifth segment which is more or less broadly and very feebly impressed in the central area against the apex in both sexes. Legs moderate in length and stoutness.

Male: Noticeably narrower, a little less robust. Abdomen broadly, rather abruptly and feebly impressed along the middle third of segments one and two and basal part of three, the impression subfusiform; impression of the fifth rather more strongly marked. Protarsi moderately broadly dilated, joints two and three subequal in width and transverse, second just noticeably longer than the third, length about equal to the apical width of the first; fourth small and triangular; mesotarsi feebly dilated; dilated joints densely clothed beneath with yellowish pubescence. Female: Broader and a little more robust. Abdomen moderately and evenly convex. Tarsal joints not dilated.

Measurements (types): Length, 5.1-5.4 mm.; width, 2.2-2.5 mm.

Holotype, male, No. 2515, and allotype, female, No. 2516, and five paratypes in the collection of the California Academy of Sciences; two are to be placed in the collection of Mr. H. C. Fall, Tyngsboro, Massachusetts. Nine specimens studied.

Type locality: **Naples, Santa Barbara County, California.** Collected in April, 1918, by H. C. Fall, to whom the species is dedicated.

A study of the metatarsi give the following results: Male—Second joint slightly longer than the third, together about a fourth longer than the first. Female—Second and third joints quite equal, together subequal to the first; fourth three times as long as the third and a little longer than the first.

According to Casey's table *falli* is to follow *histricus* Casey in the sequence of species. *Falli* differs from the latter in being more robust and black in color; *histricus* is elongate oval in form and brownish piceous in color. *Coronadensis* Blais. should precede *histricus* in the list of species and is to be differentiated from *falli* by its piceous color, dull luster, much less dilated protarsi of the male and coarser fulvous pubescence. In the three species the wings are slightly shorter or a little longer than the elytra. Those species of *Blapstinus* with well-developed wings are very rarely observed in flight. The author on two occasions has seen *dilatatus* Lec. in actual flight. The flight is heavy and labored.

Mecomycter liebecki Blaisdell, n. sp.

Form oblong-ovate, a little more than twice as long as wide, sides noticeably convergent anteriorly. Color nigro-piceous; prothorax and legs rufo-testaceous; antennæ similarly pale with the three distal joints black and joints seven and eight rufo-piceous; muzzle more or less pale beneath, palpi more or less piceous, epistoma pale. Pubescence moderately abundant, short, fine, recumbent, inconspicuous and cinereo-fuscous in color, slightly more abundant and paler on the pronotum; on the elytra abundantly intermixed with darker, nearly erect setæ of similar length; the latter less evident on the pronotum; marginal fimbriæ absent in specimens examined, although very widely spaced and erect setæ are occasionally seen on the lateral pronotal and elytral margins. The pronotal disk is often blackish centro-apically, the area varying greatly in size and intensity.

Head moderately small, a little longer than wide, quite equal in width to the pronotal apex, muzzle moderately prolonged; frons flat, feebly and longitudinally impressed each side within the eyes and antennal insertions, sides not distinctly margined, fronto-antennal articulation quite visible from above; surface rather coarsely and densely punctate, interspaces with scattered punctules, coarser punctures most noticeable at sides and vertex, finer centrally and anteriorly. Eyes rather large, moderately convex, setose and moderately prominent. Basal joints of the maxillary palpi prominent each side of the base of mentum, the latter longitudinally oblong. Antennæ rather short, not attaining the pronotal base, first joint oval and rather stout, second shorter and subglobular, third feebly obconical, less than twice as long as wide; fourth and fifth a little longer than wide, sixth noticeably shorter and smaller than the fifth, seventh to tenth inclusive slightly wider than long, eleventh short obovate.

Pronotum about a third wider than long, widest and subangulate at about basal third, where the marginal bead is visible for a short

distance when viewed from above; sides rather straight and moderately convergent in anterior two-thirds, in basal third feebly arcuate to the very obtusely rounded basal angles; base moderately arcuate and beaded in middle three-fifths; apex moderately arcuate in feeble circular arc, apical angles broadly rounded with the sides; viewed from the side the marginal acute line descends arcuately on the flanks, continuing the basal line, to a point in front of the middle of the flank, then more rapidly curving upward to become arcuately continuous with the apical line; disk moderately convex, rather coarsely punctate, punctures separated by a distance equal to their diameter, a fine groove against the basal bead.

Elytra about one-half longer than wide, slightly dilated posteriorly, apex broadly rounded, slightly reëntrant at suture with the angles obtusely rounded; base distinctly wider than the pronotal base, humeri rather broadly exposed, rounded and moderately tumid; very moderately convex on the dorsum, more strongly so laterally, coarsely but not strongly punctate, punctures separated by a distance equal to one or two times their diameter, surface slightly subrugulose basally, more finely sculptured apically. Body finely punctured beneath, pubescence short, pale and recumbent. Legs moderate in length and stoutness.

Male: Usually a little smaller and narrower. Pronotum less transverse, usually with a black apical cloud attaining the apical margin and variable in size. Elytral base less noticeably wider than the pronotal base. Antennæ gradually and distinctly incrassate in distal five joints, eleventh slightly more robust than the preceding joints, ninth and tenth transverse, about a fourth wider than long, seventh and eighth smaller and very feebly transverse and more rounded. Female: Usually larger and broader. Pronotum entirely pale, more transverse, sides less noticeably convergent anteriorly. Antennæ less stout, eleventh joint less robust, usually quite equal in width to the tenth and ninth; seventh and eighth stouter and more noticeably transverse.

Measurements (types): Length, 2.4 to 2.8 mm.; width, 1 to 1.3 mm.

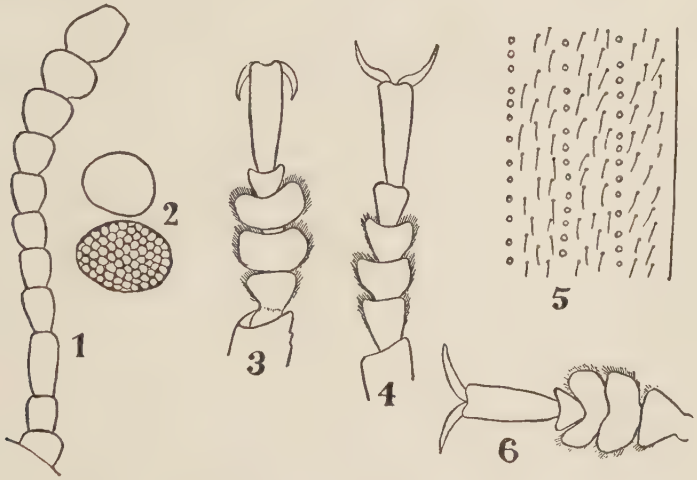
Holotype, male, No. 2517; allotype, female, No. 2518, and four paratypes, all in the collection of the California Academy of Sciences. Eight paratypes in the collection of Charles Liebeck, Philadelphia, Pennsylvania, to whom I am indebted for the specimens and opportunity to describe the species.

Type locality: **Laredo, Texas.** Fourteen specimens studied, collected on June 4. I take pleasure in dedicating the species to Mr. Liebeck.

Liebecki is very distinct in coloration from *omalinus* Horn and *facetus* Casey. *Facetus* is pale testaceous in color with some piceous clouding of the elytra, and the pronotal disk has

a black apical cloud. The muzzle is shorter in a specimen of *facetus* in the Liebeck collection than in *liebecki*. The head is missing in the type of *facetus*. In Liebeck's specimen the bases of maxillary palpi are less prominent, the mentum is oblong, smooth and truncate at apex. The edeagophore is partly protruded showing the specimen to be a male.

In *Mecomycter* the claws are slender and without appendages. The epipleuræ are subhorizontal, moderate in width and obsolete behind the middle; the pronotum is without an impressed submarginal line. The head is very moderately prolonged before the antennal insertions, epistoma feebly chitinized, and the base of the maxillary palpi are obtusely prominent beneath.



1, Left antenna of ***Blapstinus falli,*** n. sp., female; 2, Left eye of ***Blapstinus falli***: a, upper segment; b, lower segment; 3, Left protarsus of ***Blapstinus falli,*** male; 4, Right mesotarsus of ***Blapstinus falli,*** male; 5, Elytral sculpturing in sutural area, hairs directed backward, ***Blapstinus falli***; 6, Broadly dilated protarsus of ***Blapstinus rufipes*** Casey.

NOTES ON THE ORIGIN OF THE WAX SECRETION OF CERTAIN COCCINELLID LARVÆ

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The systematic and comparative study of the Coccidæ by modern workers has brought to light many facts regarding the production of wax in scale insects, the types of wax-producing pores and ducts, the function of waxy secretions, and the formation of tassels and tests. The superficial resemblance in life of certain wax-covered Coccinellid larvæ, such as *Scymnus, Cryptolæmus* and *Hyperaspis* to mealy bugs (Coccidæ), leads to an inquiry regarding possible analogies in the origin of the wax. A search of all the available literature failed to produce any satisfactory knowledge. Essig, in describing *Cryptolæmus montrouzieri* larvæ in 1910, mentioned the fact that "the body was covered with white, woolly secretions of various shapes—the covering arranged in long filaments, each filament arising from the dorsal and lateral spine areas and extending in all directions." J. H. Gage, who studied the morphology of the Coccinellid larvæ, devised an elaborate terminology for the parts of the body and arranged tables for the identification and classification of a few of the more common species, but regarding the production of wax, merely stated that the larvæ of the tribe Hyperaspini cover themselves with flocculent masses of waxlike excretion.

The purpose of this paper is to present a few facts and figures regarding the wax-producing pores found in several of the common species of Coccinellids and in an unidentified larva from Central America, all of which were covered in life with masses of white wax and projecting waxy tassels. Figures are also given of the wax-producing ducts found in a common mealy bug, *Pseudococcus gahani* Green.

My acknowledgments are due to Professor G. F. Ferris, Messrs. F. T. Scott, P. F. Wright, and L. E. Myers for the collection of valuable material used in this paper.

According to the Coccinellid terminology devised by Gage, a *struma* is a distinct moundlike projection of the body wall upon which are situated a few *chelazæ*, a *chelaza* being a slight

pimplelike projection of the body wall, usually wider than long, and bearing on its distal end a stout seta.

UNKNOWN LARVA FROM CENTRAL AMERICA

This specimen, apparently belonging to the Coccinellini, was taken by quarantine officials at San Francisco on bananas from Central America, and in life resembled a mealy bug in appearance with long lateral tassels of white wax. A prepared slide showed the presence of one struma on the dorso-lateral margins of each thoracic and abdominal segment and two strumæ on the dorso-cephalic margins of the prothorax. The dorsum of the thorax had a fair number of small and medium-sized setæ which were also more sparsely scattered over the dorsum of the abdomen.

Each struma in this species (Fig. 7) bears at the apex one long, fairly stout seta and fifteen or twenty very much smaller setæ, four around the base of the large seta being a little larger than the rest. Surrounding each seta is a band of pores arranged in spherical pattern, six pores surrounding the small setæ (Fig. 2) and sixteen pores surrounding the bases of the large setæ (Fig. 4). All the setæ scattered over the dorsum of the thorax and abdomen have these bands of pores, the number of pores varying from six to twelve, depending on the size of the setæ.

In life this larva was covered with white wax and had long, lateral tassels of wax. The presence of pores on the dorsum indicates that the body wax may be a secretion of these pores and the arrangement of pores around the groups of setæ in the lateral strumæ shows the probable source and production of the long, lateral tassels of wax. The wax is poured from the pores as a fluid, runs out over the setæ and hardens to form filaments.

CRYPTOLÆMUS MONTROUZIERI Mulsant

This well-known species, commonly known as the mealy-bug destroyer, has the body covered with white wax arranged in long tassels on the dorsum and dorso-lateral margins, and with little or no wax on the venter. Early instars, as well as mature larvæ, have this heavy covering of wax. Prepared slides show that the segments of the thorax bear a struma on the dorso-lateral margins and four or five dorsal strumæ arranged in a

transverse row, while the abdominal segments, with the exception of the ninth, bear a struma on the dorso-lateral margins and a transverse row of six to eight strumæ on the dorsum. The ninth segment is chitinized and bears numerous long setæ along the margins. The dorsum is covered with many tiny circular pores arranged in more or less circular groups (Fig. 5).

Strumæ.—The strumæ (Fig. 1) in this species are mound-like projections of the body wall bearing ten to fifteen setæ, four or five of which are long and fairly stout while the remainder are somewhat smaller and shorter. A few groups of minute circular pores are scattered among the setæ. There is considerable space between the seta and the alveolus, but there is no group of pores surrounding the seta as in the unknown larva previously described (Fig. 3).

Pores.—The dorsum is covered with groups of very minute pores, each group being somewhat circular in form and consisting of eight to twelve pores forming an outer circle with two or three enclosed pores (Fig. 5). These pore groups are very thickly arranged over the flat derm, but are only sparsely scattered over the elevated strumæ. Wax is probably poured from these hundreds of pores as a fluid and some of it runs out over the long setæ of the strumæ, and hardens to form long, waxy tassels. The production of wax and waxy filaments in *Cryptolæmus montrouzieri* is then probably similar to the production in the unknown Coccinellid larva, the wax in both species being produced from small pores as a fluid and hardening upon associated setæ to form filaments.

Hyperaspis lateralis Mulsant [1]

Pores.—The dorsum is literally covered with many pores which are of two distinct types. One type is tubular, fairly thick-walled with a slightly capitate apex in longitudinal section (Fig. 10), and in cross section is crescent-shaped, indicating that the tube is not completely closed. This form is more numerous and is noticeably larger than the second form and is considerably larger than any of the pores in other Coccinellid larvæ that I have studied. The other type of pore is tubular with the apex slightly chitinous and somewhat knoblike (Fig. 11). Pores of this smaller form are more often found

[1] The identification of this species is not certain.

around the bases of the large setæ, although not confined to those areas. The derm is tessellated so that it is divided into small, faintly outlined cells.

HYPERASPIS MOERENS (Lec.)

Pores.—The dorsal pores of this species are fewer and less conspicuous than in *Hyperaspis lateralis* Mulsant, and are of two types. The more numerous type is very small and indistinct, but appears to be ovate or subovate in shape and the pores are thinly distributed all over the dorsum (Fig. 6). The derm is tessellated and divided into small cell-like plates, each plate having two or a few more pores (Fig. 6). The tessellations fade out in parts of the derm and are not always as distinct as the figure shows. The second type of pore in *H. mœrens* is essentially the same as the tubular, capitate form found in *Hyperaspis lateralis* Mulsant, although they are considerably smaller. Like those in *H. lateralis* they are distributed rather thickly around the bases of the larger setæ.

SCYMNUS NEBULOSUS Le Conte

In this species there are two kinds of dorsal pores, each distinct in appearance and in arrangement. The smaller pores are found close to the strumæ and in the immediate surrounding area (Fig. 14), and they are arranged in more or less circular groups of four or five. Also around each of the larger single dorsal setæ there are ten to fifteen of these small pores, all arranged singly, however, instead of in groups. They seem to be simple, round pores, and are very small, about .5 mm. in diameter or less. There are also many larger, round pores, about 1 or 1.5 mm. in diameter (Fig. 13), which are generally distributed over the dorsum, but are more numerous and closer together along the lateral margins of the body where there is an indication of a cellular arrangement, but which is not as distinct as in *Hyperaspis mœrens* (Lec.).

Each struma bears one long, large seta and two shorter slender setæ of unequal size, and they are arranged in a transverse row across each abdominal and thoracic segment, each segment bearing about seven strumæ. The single setæ are more numerous and are variable in size, but are all smaller than the large setæ of the strumæ. In life this species has white wax

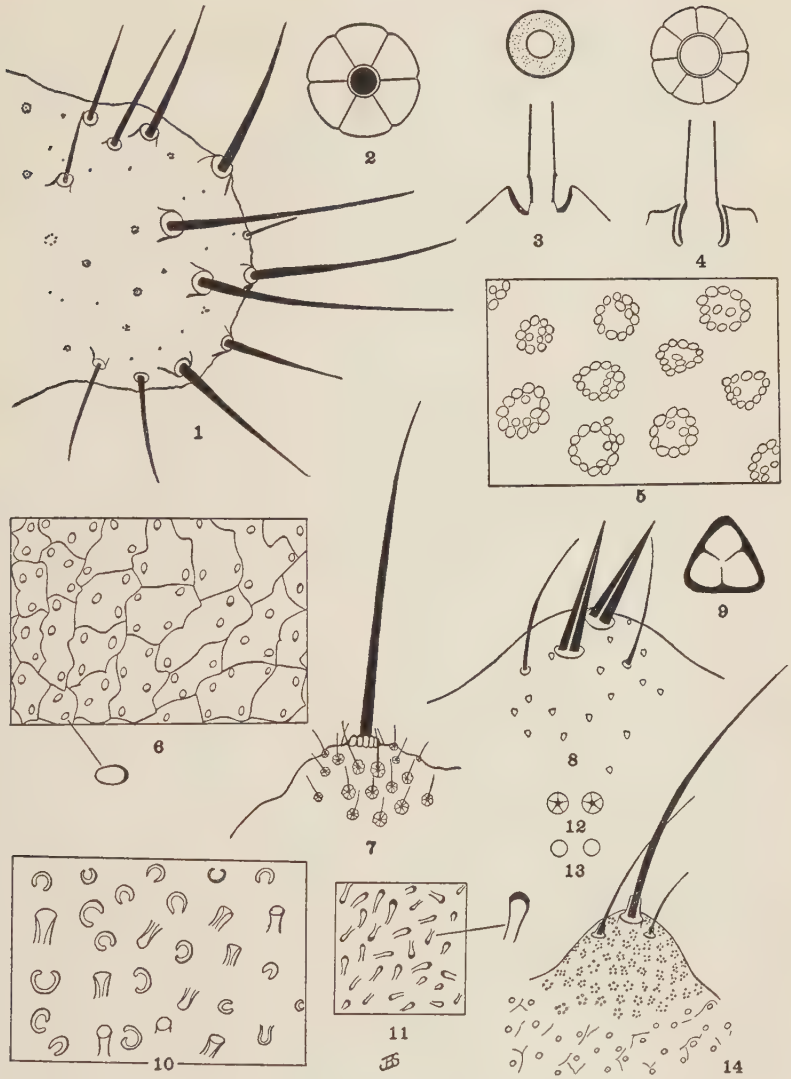
on the dorsum which is arranged in rather short tassels except on the lateral margins where the tassels are sometimes fairly long.

Scymnus guttulatus Le Conte

The arrangement of pores and of strumæ in this species is very similar to that in *Scymnus nebulosus* Le Conte, there being small pores surrounding the strumæ and setæ, and many larger pores all over the dorsum. The smaller pores are the same as the corresponding ones in *nebulosus* (Fig. 12), but the larger pores appear to be compound instead of simple, having four, five or six locelli, usually five, and resemble the stellate pores found in many of the Coccidæ, although they are very much smaller. They are slightly larger than those in *nebulosus,* however, and this may account for the visibility of the locelli, although I have studied specimens of *nebulosus* very carefully under the oil immersion objective and all the pores appeared to be the simple type without locelli. In life the wax on the dorsum is arranged in fairly long tassels, both dorsally and laterally.

It seems probable from the nature of the pores and their arrangement around the strumæ that the wax and waxy filaments in these four latter species is produced in the same manner as described for *Cryptolæmus montrouzieri* and the unknown larva.

Wax of several forms is produced by certain of the scale insects (Coccidæ), and the mealy bugs (Pseudococcinæ) are covered with white wax and wax tassels which give them a resemblance to the wax-covered Coccinellid larvæ. In order to compare the wax-secreting structures of the two groups a cerarius (Fig. 8), and a few wax pores of one of our common mealy bugs is figured. This species, *Pseudococcus gahani* Green, is covered in life with white wax except for four longitudinal rows of conspicuous dots on the dorsum. There are short, stout marginal tassels and a single pair of long, stout, caudal tassels. Among the morphological characters are the presence of seventeen pairs of cerarii, the anterior three or four pairs with three spines, the remainder with only two, those of the anal pair being considerably larger than the others. Each cerarius has numerous triangular pores and several small aux-



1, *Cryptolæmus montrouzieri,* struma; 2, Central American larva, 3, *Cryptolæmus montrouzieri,* strumal seta; 4, Central American larva, large strumal seta; 5, *Cryptolæmus montrouzieri,* section of derm; 6, *Hyperaspis mærens,* section of derm; 7, Central American larva, struma; 8, *Pseudococcus gahani,* cerarius; 9, *same,* triangular cerarian pore (enlarged); 10, *Hyperaspis lateralis,* section of derm with large pores; 11, *same,* with small pores; 12, *Scymnus guttulatus,* large pores; 13, *Scymnus nebulosus,* large pores; 14, *same,* struma.

iliary setæ. There are a few cylindrical ducts scattered over the derm and many triangular pores (Fig. 9) on the dorsum which secrete the mass of white wax. The liquid wax runs out upon the cerarian setæ and spines to harden and forms tassels, which is probably analogous to the condition in the Coccinellid larvæ. However, the pores are of a different type and size and their arrangement around the lateral setæ is somewhat different, so that there is no true homology. It is evident, therefore, that a very similar appearance in life may arise from morphologically quite different bases.

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A New Codling Moth Parasite

During the month of August 1928 the field inspectors of the Saticoy Walnut Growers' Association observed an ichneumonid which appeared to be attracted to the infested fruit. It was very active and difficult to capture. The first of September fifty immature larvæ from fruit collected at random in one orchard, where the parasite was observed, were brought in to the laboratory and examined. Fifteen had been stung and paralyzed, and on each a large elongate egg had been deposited. The female evidently oviposits through the green tissue of the husk. In one instance a parasitized larva was found in the kernel.

The size of the adults reared varied greatly, due to the variation in the size of the larvæ attacked.

Adults obtained in the field and reared in the insectary were identified by Mr. R. A. Cushman as Calliephialtes n. sp.—Stanley E. Flanders.

APHID NOTES FROM UTAH[1]

BY GEORGE F. KNOWLTON[2]

PTEROCHLORUS ROSÆ (Cholodkovsky)

This large, brown bark feeder was very abundant upon *Rosa fendleri,* on the Utah Agricultural College campus during the latter part of May and throughout June 1928. Specimens were first collected by Miss Verda Dowdle, on May 28. At this time wingless forms and nymphs were fairly abundant, but no alates were found. Early in June winged forms began appearing and were present in small numbers throughout the month. By the beginning of July, the colonies were becoming scarce, containing few individuals, and soon disappeared entirely.

This aphid is very active and easily disturbed. If an infested twig is disturbed, many of the individuals drop off; others run up or down the stem to get away or to find a hiding place. This bronze aphid was attended by large numbers of the common ant, *Formica rufa.*

Apterous vivipara. Color brown; body and appendages covered with numerous long, curved hairs; size 2.7 to 3 mm. long and about 1.7 mm. wide across the abdomen; rostrum long, reaching abdomen; head somewhat rounded, with a prominent median suture; antennæ about half the length of the body; antennal III, 0.53 to 0.58 mm. long, and armed with 4 to 7 large, oval sensoria; IV, 0.22 mm., with 1 to 3 sensoria; V, 0.21 mm.; VI, 0.15 + 0.03 to 0.16 + 0.35 mm.; legs rather long; cornicles merely raised rings on hairy, broadly cone-shaped black bases; cauda and anal plate black, rounded.

Alate vivipara. Color brown with blackish brown appendages; body and appendages covered with long, curved hairs; rostrum long, reaching abdomen; head somewhat rounded in front, with a prominent median suture; ocular tubercles moderately developed; median ocellus under the vertex of the head; antennæ reaching the abdomen; antennal III, 0.39 to 0.47 mm. long, and armed with 4 to 10 large, oval sensoria; IV, 0.17 to 0.21 mm., with 1 to 3 sensoria; V, 0.22 to 0.25 mm.; VI, 0.13 + 0.03 to 0.15 + 0.45 mm.; legs moderately long and black; wings with normal venation; front wing with radial sector curved and inserted some distance back of the point of the stigma, media indistinct; a dark pigmented patch on the membrane

1 Contribution from the Department of Entomology, Utah Agricultural Experiment Station. Publication authorized by the director, January 26, 1929.

2 The writer wishes to thank O. W. Oestlund, P. W. Mason, M. A. Palmer, and A. C. Maxson for examining certain of the forms discussed in this paper.

back of proximal part of the stigma; cornicles mere rings on broadly conical, black, hairy bases; cauda and anal plate black, rounded.

When placed alive in balsam, on a slide, like most dark aphids, this form discolors the balsam and makes a mount that is unsatisfactory for examination. Most of the specimens of this species, collected by the writer, were killed and stored in 70 per cent alcohol, punctured with a sharp needle, and left to fade out for several days, with one or two changes of alcohol to aid in the clearing process. After the specimens stopped discoloring the alcohol, they were run up through 85 and 95 per cent alcohol for about two hours in each solution. After this, the alcohol was drawn off, the excess moisture taken up with blotting paper, and a quantity of clearing cedar oil poured on. After remaining in cedar oil for about twenty-four hours, the specimens were mounted directly in balsam. This provided good, clear mounts, with practically no breaking of antennæ, legs, or distortion of wings.

Fig. 1. *Pterochlorus rosæ* (Chol.). A, antenna of alate viviparous; B, antenna of apterous viviparous; C, rostrum or beak of apterous; D, front wing of alate; E, head of alate; F, cornicle of apterous.

Periphyllus negundinis (Thomas)

This pale yellowish, hairy aphid is very commonly found in Utah, sometimes causing damage to the box elder, *Acer negundo,* upon the leaves of which it feeds. The tiny, very much depressed dimorphs, with their fan-like setæ are encountered on the leaves during the summer months, apparently making no growth for weeks at a time. The writer has collected this species in Utah from Bountiful, Brigham City, Brigham Canyon, Centerfield, City Creek Canyon, Emigration Canyon, Farmington Canyon, Logan, Logan Canyon, Mona, Newton, Provo, Salina, Salt Lake City, Spanish Fork, and Tremonton. Collections have also been made in Idaho at Clifton, Dayton, Malad, and Preston.

Chaitophoroides middletonii (Thomas)

This long-beaked dandelion aphid was collected on one of the Utah Agricultural Experiment Station farms in North Logan, Utah, on September 4 and 7, 1926. The first collection was made by Mr. A. C. Burrill and the writer while they were examining aphid and ant associations in connection with ant behavior and control studies.

This greenish blue to yellowish green aphid was very numerous, feeding on the crown and root of the common dandelion, *Taraxacum officinale*. All of the aphids were under the surface of the ground, and those on the roots extended to a depth of about three inches. Ants, *Formica rufa*, were very abundant, and had formed a sort of thatch of alfalfa straws and grass around the infested dandelions.

This species is interesting because of its subterranean habits, its reticulated and pruinose-covered body, and the possession of numerous long, fine, Chaitophorus-like hairs on the legs and antennæ.

Apterous vivipara. Body greenish blue to yellowish green, grayish pruinose, and covered with reticulations; lateral and dorsal black areas cover part of each body segment; size 1.8 to 2.3 mm. long and 1.25 mm. wide across the abdomen; antennæ 1 mm. long and black, except distal ends of III, IV, and V, which are light; antennal III, 0.22 to 0.27 mm. long and armed with 0 to 14 sensoria (usually 7 to 12) which are more numerous on the distal half of the segment; IV, 0.14 to 0.16 mm., with 1 to 8 sensoria (usually 2 to 7); V, 0.13 to 0.17 mm., with 0 to 3 sensoria in addition to the primary sensorium which is situated well back from the apex of the segment; VI, 0.1 + 0.18 to 0.1 + 0.2 mm., with 0 to 1 secondary sensorium on basal portion of the segment; legs short and covered with a great number of fine sensilla; abdomen with lateral tubercles which are best developed on the first abdominal segment and back of the cornicles; cornicles black, cylindrical with a weak flange, and 0.15 mm. to 0.18 mm. long; cauda black, moderately long, tapering beyond the broad basal portion, and with numerous sensilla; anal plate black, rounded.

Alate vivipara. Color of head, thorax and appendages, blackish to black, abdomen green with lateral patches of black; size 1.5 to 1.8 mm. long; rostrum long, reaching third coxæ; antennæ black except apical ends of III, IV, and V, which are light; antennal III, 0.31 to 0.35 mm. long, and armed with 21 to 32 wide margined sensoria of various sizes, occurring in larger numbers on the distal half of the segment; IV, 0.15 to 0.18 mm., with 8 to 15 sensoria; V, 0.14 to 0.16 mm., with 5 to 8 secondary sensoria in addition to the hair-fringed primary sensorium; VI, 0.1 + 0.18 to 0.11 + 0.21 mm., with 0 to 1 secondary sensorium on basal part of segment; prothorax with well-developed tubercles; wings with normal venation; legs moderately developed and armed with numerous sensilla; abdomen with lateral tubercles which are largest on the first segment and back of the cornicles; cornicles black, 0.15 mm. long, cylindrical and with a weak flange; cauda black, tapering gradually from broader base to rounded apex, and armed with numerous hairs.

Apterous ovipara. Color green, yellowish green or reddish green; body covered with reticulations, grayish pruinose, with fewer black areas than in the apterous viviparous; size 1.75 to 2.2 mm. long and 1.1 mm. wide across the abdomen; rostrum reaching third coxæ; antennæ black, seldom reaching 1 mm. in length, and situated on poorly developed tubercles; antennal III, 0.17 to 0.19 mm. long, and without sensoria; IV, 0.11 to 0.13 mm.; V, 0.11 to 0.13 mm.; VI, 0.1 + 0.16 to 0.1 + 0.19 mm.; prothoracic tubercles well developed; legs short and covered with numerous fine sensilla; abdomen with lateral tubercles, the first and last pairs being largest; cornicles black, cylindrical, with a weak flange, and 0.15 mm. long; cauda slightly shorter and more blunt than in apterous viviparous, and with about 12 to 14 sensilla; anal plate black, rounded.

Eggs 0.52 to 0.55 mm. long and about 0.22 mm. thick.

Alate viviparous, apterous viviparous and apterous oviparous females were all present when the first collection was made in early September, 1926.

This aphid seems to be *Aphis middletonii* Thomas. It has a bushy cauda, hairy legs, and is a root feeder. Instead of having a body of almost a uniform lead gray, it differs from the original description [3] in having the head black, and black lateral and dorsal areas on the thorax and abdomen of the apterous viviparous forms. The antennæ are blackish to black, instead of lighter than the body, and the cornicles and cauda are black, instead of lead gray or lighter colored. This is the same species as that collected by H. L. Sweetman [4] from the roots of dandelion at Ames, Iowa, August 12, 1924, and determined *middletonii* Thomas, by Dr. E. M. Patch. Mr. Sweetman very kindly lent the writer slides of this species, for comparison with the Utah material.

Fig. 2. *Chaitophoroides middletonii* (Thomas). A, antenna of alate viviparous; B, antenna of apterous viviparous; C, antenna of apterous oviparous; D, section of reticulated body surface from side of abdomen of apterous viviparous; E, apterous viviparous; F, cornicle of oviparous; G, cornicle of apterous viviparous; H, cornicle of alate; I, cauda of oviparous; J, cauda of apterous viviparous; K, cauda of alate.

Chaitophoroides populifoliæ (Fitch)

This speckled poplar aphid was present in Smithfield Canyon, Utah, on August 24, 1925. Enormous numbers of both winged

[3] Thomas, Cyrus. Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, pp. 99-100, 1877.

[4] Sweetman, H. L. Notes on Insects Inhabiting the Roots of Weeds. Annals of the Ent. Soc. of America, Vol. 21, No. 4, p. 595, 1928.

and wingless females were attacking the apical leaves and tender bark on nearly all branches of infested trees. Both surfaces of the leaves were commonly attacked by this aphid so that handling of the infested parts of the plant stained the hands reddish brown from the body liquids of individuals that became mashed. A large black ant was attending this aphid, and numerous syrphid larvæ were feeding upon it.

Additional collections of this species have been made at Birch Canyon and Big Cottonwood Canyon in Utah, and in Immigration Canyon, Idaho.

Apterous vivipara. Color brownish red with white flocculent patches over parts of the body; size 2.5 to 2.8 mm. long and 1.4 to 1.6 mm. wide across the abdomen; rostrum scarcely reaching third coxæ; head, antennæ and legs armed with numerous long, slender hairs; antennal III, 0.51 to 0.53 mm. long, and armed with 14 to 23 round sensoria; IV, 0.27 to 0.31 mm.; V, 0.21 to 0.25 mm.; VI, 0.11 + 0.45 mm.; prothoracic tubercles present; legs fairly long; abdomen with three pairs of lateral tubercles; cornicles black, 0.6 to 0.7 mm. long, somewhat cylindrical but thicker toward base; cauda black, elongate with constriction near base and armed with numerous hairs; anal plate black, rounded.

Alate vivipara. Head and thorax black, abdomen reddish brown with white areas of waxy secretion; size 2.3 mm. long; rostrum nearly reaching third coxæ; antennæ and legs armed with numerous elongate, thin hairs; antennal III, 0.41 to 0.47 mm. long and armed with 20 to 32 round sensoria; IV, 0.22 to 0.24 mm., with 0 to 3 sensoria; V, 0.21 to 0.23 mm.; VI, 0.1 + 0.37 to 0.1 + 0.4 mm.; prothoracic tubercles well developed; wings large, with normal venation; legs moderately long; abdomen with three pairs of lateral tubercles; cornicles black, 0.36 to 0.5 mm. long, slightly thickened toward the base; cauda black, elongate, and armed with numerous hairs; anal plate black, rounded.

Alate male. Size 1.5 mm. long; rostrum reaching third coxæ; body in general resembles the alate viviparous forms, except in size; antennæ black; antennal III, 0.43 mm. long and armed with 35 to 40 round sensoria; IV, 0.27 mm., with 10 to 17 sensoria; V, 0.21 mm., with 4 to 13 secondary sensoria; VI, 0.1 + 0.36 mm.; prothoracic tubercles well developed; wing venation normal; legs moderately long and slender; cornicles black, 0.21 mm. long; cauda black, elongate, tapering beyond the base, and armed with numerous hairs; anal plate black, broadly rounded.

Described from one male collected in Smithfield Canyon on August 24, 1925. This is early for the sexual forms of most species to occur in Utah.

Fig. 3. *Chaitophoroides populifoliæ* (Fitch). A, antenna of apterous viviparous; B, antenna of alate viviparous; C and D, cornicle and antenna of alate male; E, cauda of alate viviparous; F, cauda of apterous viviparous; G, cauda of male; H, cornicle of alate; I, cornicle of apterous viviparous.

Aphis chrysothamnicola[5] **infrequens** Knowlton, n. sp.

This greenish black aphid was collected ot Trenton, Utah on June 16, 1927, on the leaves of the common sagebrush, *Artemisia tridentata.*

Alate vivipara. Color black with green and black abdomen; size 1.5 mm. long and fairly broad; anterior margin of head rounded, with antennal tubercles undeveloped; antennæ dusky to black and slightly shorter than body; antennal III, 0.3 mm. long and swollen throughout the median half, which carries four round sensoria arranged in a row; IV, 0.24 mm.; V, 0.21 mm.; VI, 0.13 + 0.21 mm., with the filament slightly thicker toward distal end; prothorax with prominent tubercles; wing venation regular, veins dusky with slightly shaded borders; legs fairly short; cornicles black, 0.11 mm. long, larger toward apex, with a well-developed flange; cauda black, upturned, elongate, with a slight constriction near base; anal plate black, rounded.

Aphis infrequens resembles *Aphis hermistonii* Wilson in many respects. It differs from the latter species in having a larger body, slight shading along the wing veins, longer antennal segments, and having antennal III noticeably swollen throughout its middle one-half.

Fig. 4. *Aphis infrequens.* A, antenna; B, wings; C, D, cornicles; E, prothoracic tubercle, of alate viviparous.

Aphis pomi De Geer

This green apple aphis is very common in Utah, and often does considerable damage. The writer has collected this species from Farmington, Garland, Kanesville, Logan, Mendon, Provo, River Heights, St. George, Salt Lake, Tremonton, and Trenton, in Utah, and from Clifton, Idaho.

Anuraphis roseus Baker

This rosy apple aphis was rather abundant at Provo, Utah, on June 13, 1923, and some damage was resulting to the apple leaves. Usually this form is rather rare in Utah orchards.

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[5] Gillette, C. P., and Palmer, M. A. 1929. New Colorado Aphididæ. In Annals Ent. Soc. America, Vol. 22, No. 1, pp. 5-7. In preparing this paper the species was described as new, but after the manuscript was in the hands of the printer, Prof. Palmer suggested that the species might be only a variety of a form that Dr. Gillette and she then had in the hands of the publisher, which apparently is the case.

ANURAPHIS PERSICÆ-NIGER (Smith)

During the summer of 1924 the writer collected this species on peach trees in Utah from Perry and Provo.

MYZOCALLIS DISCOLOR (Monell)

This smoky-winged aphis occurs rather commonly in Utah, feeding upon the oak, *Quercus gambellii* and *Q. utahensis*. Collections have been made at Bountiful, City Creek Canyon, Devil's Gate (in Weber Canyon), Farmington, Ogden, Parley's Canyon (elevation 7000 feet), Provo, Salt Lake City, Sugar House, and Willard, in Utah.

Alate vivipara. Size 1.2 to 1.83 mm. long; rostrum short, not reaching second coxæ; head triangular to pointed in front, antennæ slender, about as long as the body, pale, except distal ends of III, IV, V, and most of VI, which are dusky, and armed with a few short, bristle-like hairs; antennal III, 0.35 to 0.46 mm. long with 2 to 6 large round or oval sensoria on somewhat thicker basal portion; IV, 0.23 to 0.31 mm.; V, 0.25 mm.; VI, 0.11 + 0.2 to 0.13 + 0.23 mm.; wings with normal venation, and with smoky areas covering part of the membrane and at distal ends of veins of forewing; abdomen yellowish, with dusky areas on sides and dorsum; cornicles dusky to pale, short, truncate 0.06 to 0.07 mm. long; cauda knobbed; anal plate bi-lobed.

Apterous ovipara. Body covered with long capitate hairs; size 1.7 to 2.3 mm. long; rostrum short, barely reaching second coxæ; antennæ armed with a few strong, capitate hairs; antennal III, 0.35 to 0.38 mm. long; IV, 0.24 to 0.27 mm.; V, 0.21 mm.; VI, 0.1 + 0.18 to 0.11 + 0.19 mm.; hind tibia swollen and covered with numerous sensory areas; tip of abdomen very elongate.

Described from specimens collected at Bountiful, Devil's Gate, and Willard in Utah, September 14, 1925.

Alate male. Size 1.3 mm. long; antennæ thicker than that of females; antennal III, 0.5 mm. long, with 24 to 28 large sensoria; IV, 0.33 mm. with 10 to 14 sensoria; V, 0.31 mm. with 5 to 8 secondary sensoria; VI, 0.15 + (?, broken off) with 2 to 4 sensoria on basal portion; wings with dusky areas as in the winged female.

Described from specimen collected at Bountiful, Utah, September 14, 1925.

Fig. 5. *Myzocallis discolor* (Monell). A, antennal III; B, wings; C, cauda; D, cornicle; E, anal plate; F, cornicle; G, hooks on anterior margin of hind wing (much enlarged); H, head, all of alate viviparous; I, head of apterous oviparous.

Amphorophora accidentalis Knowlton, n. sp.

This aphid was collected on the apical growth of sagebrush,

Artemisia tridentata, near Dry Lake, Utah, on August 10, 1927. The dark wing veins are its most conspicuous feature.

Alate vivipara. Size 1.5 mm. long; head with prominent antennal tubercles; rostrum just reaching third coxæ; head and antennæ armed with prominent, apically spear-shaped sensilla about as long as thickness of antennal III; antennæ dusky to base of III and black beyond; antennal III, 0.66 mm. long, and armed with 24 to 37 small, round sensoria; IV, 0.5 mm., with 12 to 15 sensoria; V, 0.42 mm., with 9 or 10 sensoria; VI, 0.09 + 0.53 mm.; wings with venation normal, veins blackish brown, and with very slight dusky shading at margins of veins on front wings; legs long; hind tibia 1.3 mm. long; cornicles light to slightly dusky, 0.27 mm. long, smooth, and with a prominent flange; cauda slightly dusky, elongate, blunt at end, with 4 or 5 lateral hairs on each side; anal plate dusky, broadly rounded.

This species is near *Amphorophora pergandei* Mason, but differs in having shorter cornicles and antennal segments, and considerably fewer sensoria on antennals III and IV. It differs from *A. aridus* in having longer sensilla on head and antennæ, fewer sensoria, and smooth, thicker and shorter cornicles.

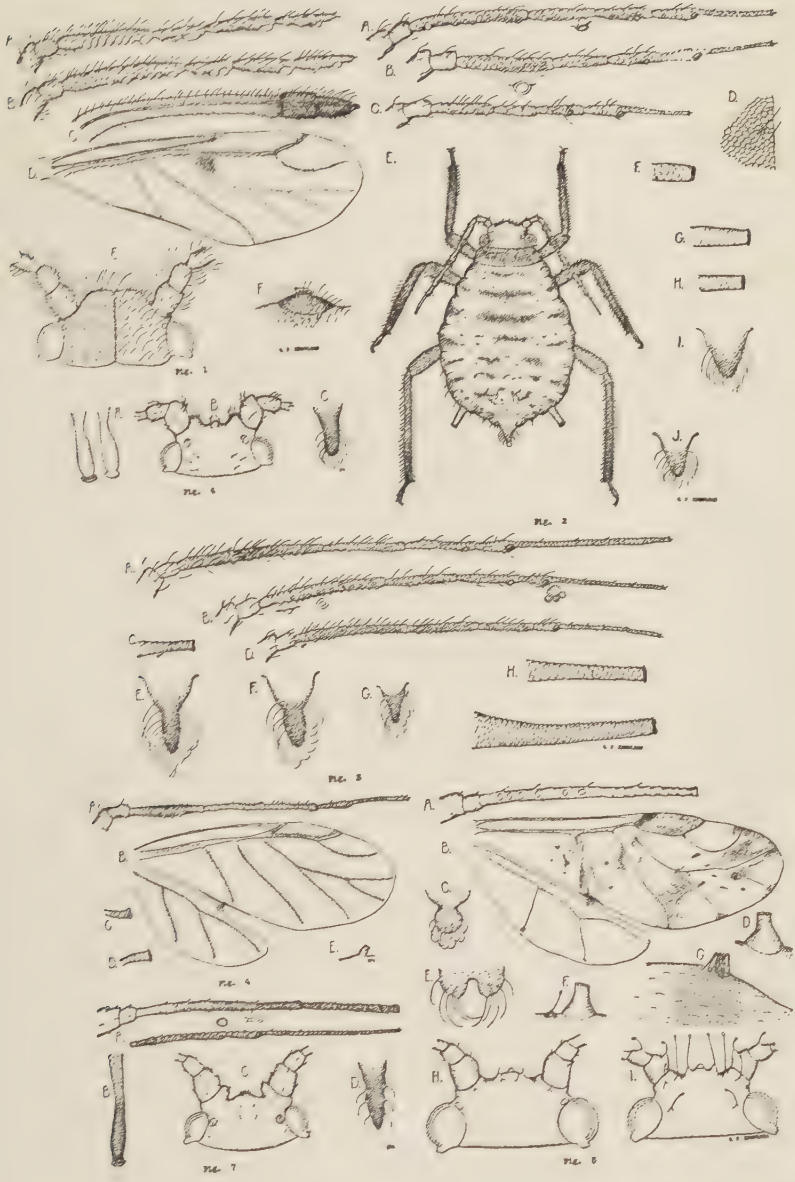
Fig. 6. *Amphorophora accidentalis* n. sp. A, cornicles; B, head; C, cauda, of alate viviparous.

Amphorophora aridus Knowlton, n. sp.

This shiny green aphid was collected from the apical growth of sagebrush, *Artemisia tridentata,* at Amalga, Utah, on May 12, 1928.

Alate vivipara. Size 1.65 mm. long; rostrum scarcely reaching second coxæ; head, prominent antennal tubercles and antennæ armed with a few short, apically enlarged sensilla; antennæ longer than the body and black beyond basal portion of III; antennal III, 0.6 mm. long and armed with 17 round sensoria in a fairly regular row; IV, 0.36 mm. with 2 or 3 sensoria; V, 0.35 mm.; VI, 0.12 + 0.5 mm.; lateral tubercles lacking; wings large, venation normal, veins slender and blackish brown; legs long; hind tibia 1.3 mm. long, with tarsus 0.1 mm. long; cornicles lighter on basal portion, black beyond, 0.43 mm. long, surface imbricated, and with two or three rows of closed reticulations before the flange; cauda green to slightly dusky, long, with three hairs on each side and two on dorsal surface near distal end; anal plate dusky, rounded.

This species differs from *Amphorophora brittenii* Theobald in having fewer sensoria on antennals III and IV and with cornicles much less inflated. It differs from *A. reticulata* Mason in having a longer cauda compared with length of cornicles, and less reticulated areas on cornicles, and from *A. spiræcola* Patch in having sensoria on antennal IV.



The type slides are retained in the collection of the writer.

Fig. 7. *Amphorophora aridus* n. sp. A, antenna; B, cornicle; C, head; D, cauda, of alate viviparous.

Acyrtosiphon pisi (Kaltenbach)

This green pea aphis was very abundant in Utah during the summer of 1928 and did considerable damage to alfalfa in the seed-growing areas of Millard County. Slight damage to field and garden peas in northern Utah was also noted.

Work of the Pacific Oak Twig Girdler Conspicuous in the Yosemite Valley

Many of the California black oaks (*Quercus kelloggii* New.) in the Yosemite Valley during August, 1929, were spotted thickly with small patches of yellowing leaves. Examinations indicated that this is the work of the Pacific oak twig girdler, *Agrilus angelicus* Horn. In practically all cases the flat oval scale-like shiny black egg was found on the bark near the tip of last year's growth, and the small white borer was found in a spiral mine beneath the bark of the twig. Apparently the beetles which produced the present infestation came from the canyon live oak, *Quercus chrysolepis* Lieb. So far as known, the insects which attack the black oak do not complete their development, but die before the end of the first year. Those that attack the live oak do complete their development and furnish the beetles which carry on the species.—H. E. Burke.

Note on Notoxus

While classifying the species of Notoxus in the collection of the California Academy of Sciences it was noted that the illustrations given in the Biologia Centrali Americana (Coleoptera, Vol. IV, Pt. 2, Tab. 9, Figs. 21 and 21a) of *calcaratus* Horn do not agree with the description of that species. In *calcaratus* the horn is coarsely serrate and the crest carinate; this is not so in figs. 21 and 21a. Fig. 20a, of *Notoxus hirsutus* Champ., agrees with Horn's description of *calcaratus*. Evidently a mistake has been made, either in drawing or in the position of the figure.—Frank E. Blaisdell, Sr.

A NEW SPECIES OF THE ENCYRTID GENUS METAPHYCUS FROM WASHINGTON (HYMENOPTERA)

BY P. H. TIMBERLAKE
Citrus Experiment Station, Riverside, California

The parasite described herewith was reared by Professor Trevor Kincaid from *Eulecanium coryli* (Linn.) at Seattle, Washington, and its work is thought to be the cause of the practical extermination of this scale around Seattle.

Metaphycus kincaidi Timberlake, n. sp.

The female is similar to *M. coquilletti* (How.) from which it differs in having the ocellar triangle equilateral, the frontovertex rather less than twice as long as broad, the wings moderately wide, with the cut-off portion of speculum separated from the hairless streak of the posterior margin, the abdomen piceous above instead of pale yellowish, the annuli of the tibiæ broad and entire, the scape conspicuously white only at apex, etc. The male is similar to *M. maculipennis* (Timb.) and *M. melanostomatus* (Timb.). It differs from *maculipennis* in having the tibiæ annulated, the wings uniformly hyaline, pubescence of mesonotum short and whitish, the antennæ much paler in color and less densely hairy, etc. From *melanostomatus* (considered by Silvestri and Mercet to be the true *punctipes* Dalman, but this is at least doubtful) it differs in having the frontovertex no wider than long, the ocellar triangle equilateral, the cheeks and malar region not almost entirely black, the flagellum less densely hairy, etc.

Female. Head as long as wide, rather thick fronto-occipitally. Frontovertex about one and three-fourths times longer than wide. Ocelli nearly in an equilateral triangle, the posterior pair slightly closer together than distance from either to anterior ocellus, and nearly their own diameter from the eye margin. Antennal scrobes rather deep, united above and separated below by the facial prominence, which is as long as broad. Malar space about as long as width of eyes. Scape, excluding radicle joint, one-third as wide as long and widest slightly beyond the middle. Pedicel a little more than twice as long as thick and a little exceeding the length of the first two funicle joints combined. Funicle increasing gradually in thickness distad, the first four joints subequal and about as long as thick. The last two funicle joints much larger, the fifth somewhat

longer than wide and the sixth a little wider than long. Club broadly oval, obliquely rounded at apex and slightly exceeding one-half the funicle in length. Thorax twice as long as wide. Parapsidal lines of mesoscutum distinct laterad but becoming very faint mesad. Wings and venation normal, the discal setæ fine, dense, and uniform. Speculum slightly widened below, the cut off portion separated by one row of setæ from a very narrow, obscure branch of the basal hairless streak on the posterior margin of wing. Legs and abdomen normal, the ovipositor not protruded. Sculpture normal, the microscopic granulation of mesonotum slightly coarser than in *melanostomatus*. Mesonotum with thin appressed whitish setæ as in allied species. Eyes with a fine short pubescence.

Frontovertex, face and cheeks very pale orange yellow (nearly ochraceous buff, Ridgway). Line across oral margin of face and a large spot anteriorly on the cheeks, piceous. Notum of thorax and abdomen piceous, the mesonotum dull, slightly brownish, and with the lateral margins of mesoscutum more or less shading into pale yellowish. Collar of pronotum white with a fuscous dot at each end. Tegulæ white with a fuscous spot on outer margin. Under parts of thorax, legs and venter toward base dusky creamy white, the mesopleura clouded with pale fuscous at the middle beneath. Apex of last joint of tarsi, apex of front and hind femora, apex of front tibiæ and base and apex of middle tibiæ narrowly piceous. Tibiæ with two rather broad oblique piceous annuli, obscure on the front pair. Antennæ piceous, with the apex of scape, narrow line on dorsal margin of scape, extreme base of scape proper, apical half of pedicel and last three funicle joints, white, the fourth funicle joint, however, more or less dark on outer side toward base. Apical margin of club obscurely whitish. Wings hyaline, the venation yellowish.

Length of body, (1.10 to) 1.26; length of head, 0.419; width of head, 0.424; width of frons at anterior ocellus, 0.146; length of antenna, 0.770; length of scape, excluding radicle, 0.242; width of scape, 0.087; width of mesoscutum, 0.487; length of fore wing, 1.48; width of fore wing, 0.63 mm.

Male. Head about as broad as long, moderately thin frontooccipitally, subquadrate as seen in frontal view, with the sides gently rounded, the cheek converging broadly toward the mouth and the dorsal margin very slightly rounded. Malar space almost as long as eyes. Occiput moderately concave, with the neck inserted very slightly above the center. Eyes as seen in frontal view strongly divergent below. Frontovertex about as long as wide, Ocelli in an equilateral triangle, the posterior pair about their own diameter from the eye margin and a little farther removed from the occipital margin. Antennal sockets placed somewhat above the clypeal margin and about the width of vertex apart. Scrobal impressions joined above, shallow and broad. Prominence between antennæ low, broad, and angled above. Scape compressed, subfusiform, widest before

the middle, and slightly less than one-third as wide as long, excluding the radicle joint. Pedicel barely longer than wide and shorter than the first funicle joint. Flagellum hardly increasing in thickness distad and clothed with numerous outstanding hairs, which are about as long as the thickness of the joints. Funicle joints 1, 2, and 5 somewhat longer than the others and about one-fourth to one-third longer than thick, the others not or hardly longer than thick. Club entire, conically tapering to the blunt apex and about as long as the last two funicle joints combined. Maxillary palpi four-jointed, the labial palpi two-jointed and extremely short. Mandibles with three very short blunt teeth. Thorax about twice as long as wide. Parapsidal lines of mesoscutum obliterated. Scutellum as long as mesoscutum and rather strongly acute at apex. Wings and venation normal, the discal setæ short, uniform and rather dense. Speculum hardly widened below, the cut-off portion separated from the main portion and from the basal hairless streak on posterior margin of wing by two lines of setæ. Spur of middle tibiæ as long as the basitarsus. Middle tarsi hardly thicker than the hind pair. Mesonotum with thin whitish rather inconspicuous short appressed setæ. Eyes virtually bare.

Head pale yellowish, with upper half of occiput piceous, the dark area extending triangularly on to vertex as far as the anterior ocellus, or sometimes entire vertex dark. Dark area also rather faintly and narrowly extending along margin of cheeks and occiput to the mouth, the cheeks on each side of mouth having a definite dark area which extends narrowly across oral margin. Thorax above and abdomen dull piceous, the lateral margins of mesoscutum sometimes somewhat yellowish. Tegulæ, except fuscous spot on outer margin, and collar of pronotum, except fuscous dot at each end, white. Under parts of thorax and legs dusky creamy white. Extreme tip of front femora and tibiæ, last joint of tarsi, and two obscure annuli on middle and hind tibiæ, fuscous. Antennæ pale dusky yellowish, the scape along dorsal margin and pedicel, except at apex, fuscous. Wings hyaline, the venation dusky yellowish.

Length of body, (0.75 to) 0.91; width of mesoscutum, 0.288; length of antenna, 0.771; length of scape, excluding radicle joint, 0.173; width of scale, 0.055; length of fore wing, 1.03; width of fore wing, 0.452 mm.

Described from two females, three males (holotype ♀, allotype, and paratypes), reared from *Eulecanium coryli* (Linn.), Seattle, Washington, June, 1926 (T. Kincaid).

Types in United States National Museum.

MR. WALTER M. GIFFARD—AN APPRECIATION

BY E. P. VAN DUZEE

In the death of Mr. Walter M. Giffard, which occurred at Honolulu, June 30, 1929, the California Academy of Sciences has lost an active member and a true friend.

Born in England in 1856, he removed to the Hawaiian Islands in 1875 when but nineteen years of age, where he has since resided. He soon became connected with the Hawaiian sugar interests at a time when they were rapidly developing. His special interest in the Experiment Station of the Hawaiian Sugar Planters Association began in 1903, when he took a leading part in the organization of a department of entomology and instigated an almost world-wide search for natural enemies of the cane leafhopper by Mr. Albert Koebele and others. The biological control measures applied to the sugar-cane industry, then threatened with extinction in the islands, proved very efficient and practically saved the industry. Mr. Giffard took a large part in the organization of the very considerable and efficient entomological activities on the islands, including the quarantine regulations adopted by the Hawaiian Government to prevent the introduction of additional pests. This association with entomologists and entomological work on the islands aroused Mr. Giffard's interest in the insects themselves and he built up a large collection of native Hawaiian insects, especially complete in certain groups of the Coleoptera, Hymenoptera, and Hemiptera. In his earlier work, that on genus Odynerus in the Hymenoptera and Plagithmysus in the Coleoptera is perhaps best known. Probably his best work was done later in the Homopterous family Fulgoridæ, in the Delphacids and Cixiids. In these two groups he made large collections, both in the Hawaiian Islands and in California, publishing the result in the Proceedings of the Hawaiian Entomological Society. In the Delphacids he collaborated with Mr. Frederick Muir, making most of the genitalic mounts and drawings for certain of their joint papers, both of which were beautifully done and very accurate. He also made the drawings for a joint paper on the Delphacid genus Pissonotus which it is hoped may soon be published. Probably the best taxonomic

paper published by him was that on Hawaiian Cixiidæ, published in the Proceedings of the Hawaiian Entomological Society, Vol. VI, pp. 51-172, plates I-VIII, 1925.

Mr. Giffard was a life member and a Fellow of the California Academy of Sciences, a member of the Pacific Coast Entomological Society, Fellow of the Entomological Society of London, a member of the American Association of Economic Entomologists, and a charter and life member of the Entomological Society of America as well as of the Hawaiian Entomological Society. He was also a Fellow of the American Association for the Advancement of Science and a member of the Biological Society of Washington. In California he will perhaps be best known for the deep interest he took in the welfare of the California Academy of Sciences. He was instrumental in the securing by the Academy of the large collection of insects made by the late Mr. Albert Koebele, presented to the Academy by Mrs. Koebele at Mr. Giffard's suggestion. Mr. Giffard also presented to the Academy of Sciences interesting series of Hemiptera taken by him in California, some characteristic Hawaiian Delphacids, and more recently his entire collection of North American Delphacids. Mr. Giffard was a true friend and a genial companion, and his passing will be a real loss to all who had the good fortune to know him.

A RARE WASP FROM OREGON

In the valuable collection of Hymenoptera left to the California Academy of Sciences by the late Charles L. Fox is one pair of *Odynerus margaretellus* Rohwer (Proc. U. S. Nat'l Mus., ~~LXIV~~, 242, 1915), taken by Mr. Fox at Klamath Falls, Oregon, May 10, 1924. This species is peculiar in its genus in the bright red markings on the body and legs. The male possesses the black central spot found in the type female. The second sternite is without the black spot in both sexes. Mr. Rohwer took the type in Colorado.—E. P. Van Duzee.

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E. P. VAN DUZEE, Editor S. B. FREEBORN, Ph.D., Treasurer

EDITORIAL COMMENT

An annoying typographical error occurred in the April number of THE PAN-PACIFIC ENTOMOLOGIST. On page 167 the description of the type female of *Triepeolus subnitens* was designated as that of the male and in the next paragraph the description of the male was designated as that of the female. Again on page 169 the description of the female of *Triepeolus trichopygus* was designated as the male, while the male in the next paragraph is correctly designated. Subscribers are requested to make these corrections in their copies.

Most of our local entomologists have returned from their summer's field work and all report excellent success. The weather was cold and windy until about the eighth of June, with a heavy fall of snow in the Sequoia National Park down to the 7000-foot level. Butterflies and most Coleoptera were very scarce in Owens Valley, but higher up in Mono County and at Carson City, Nevada, and at Tahoe they were becoming more abundant. Dr. Van Dyke found the development of insect life in the Sequoia National Park about as that in Mono County. In Nevada Dr. Blaisdell found conditions very dry for insect life, but he brought home some interesting species.

Dr. A. S. Fawzy, Department of Plant Quarantine and Control, Alexandria, Egypt, and Dr. and Mrs. Mortimer D. Leonard of Cornell University, were welcome visitors at the California Academy of Sciences about April 1. Other visitors at the Department of Entomology were Mr. R. H. Beamer and party and Dr. P. W. Lawson of the University of Kansas and Dr. Otto Swezey of Honolulu.

Twelve new metal-covered cases have recently been added in the Department of Entomology at the Academy. These will hold 288 drawers of the standard size used by the Academy (17 x 19 inches), a portion of which will have glass on both top and bottom for the reception of the diurnal lepidoptera. The remaining drawers will be used for the Coleoptera, Hemiptera, Diptera, and other insects as they are rearranged into the unit boxes now being used by the Academy.